BASIC ACADEMY PHYSICAL CONDITIONING MANUAL

1996

THE COMMISSION
ON PEACE OFFICER STANDARDS AND TRAINING

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CALIFORNIA COMMISSION ON PEACE OFFICER STANDARDS AND TRAINING

POST

BASIC ACADEMY

PHYSICAL CONDITIONING MANUAL

1996

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PREFACE

The material contained within the POST Basic Academy Physical Conditioning Manual represents the culmination of extensive POST-sponsored research to establish job-related entry-level physical ability standards for California peace officers. The research was conducted in response to PC 13510(b), which required that POST investigate various job-related entry-level standards, including physical ability.

At a public hearing held in January 1985, the POST Commission acted to make the conditioning program described in this manual a mandatory part of the POST Regular Basic Course effective July 1, 1985. In so doing, it further acted to require that all cadets pass a job-related physical abilities test (the POST Job-related Work Sample Test Battery) as a condition for graduation from basic training.

In 1989 a committee comprised of academy physical training instructors, exercise physiologists and POST staff reviewed and subsequently revised portions of the exercise program. Changes were made in order to simplify program administration and promote cadet safety. In 1996 the manual underwent further modification to bring it into conformity with POST's Training Specifications for the Regular Basic Course.

All aspects of both the revised conditioning program and the required tests are contained within this manual. The manual was developed for use by basic academy administrators and physical training instructors and is intended to assure that uniform and job-related practices are followed statewide to develop and assess the physical abilities of all basic course students. Questions about the conditioning program or about this manual, should be directed to the POST Standards and Evaluation Services Bureau at (916) 227-4820.

Kenneth J. O'Brien

KENNETH J. O'BRIEN
Executive Director

ACKNOWLEDGMENTS

Many individuals contributed to the successful development of this manual. First and foremost, POST wishes to express its gratitude to all those officers and academy cadets who were directly involved in the research which resulted in the establishment of the job-related conditioning program and associated tests. Without their support and assistance, this project would not have been possible.

Special thanks go to the academies and agencies which permitted POST to pilot test the physical abilities program and test batteries. They are:

Academies

Central Coast Counties Peace Officer Academy
Evergreen Valley College Criminal Justice Training Center
Los Angeles Police Academy
Los Angeles County Sheriff's Academy
Santa Rosa Training Center
San Diego County Sheriff's Academy

Agencies

Fairfield Police Department
Sacramento Police Department
Sacramento Sheriff's Department
San Joaquin Sheriff's Department
San Jose Police Department

The following individuals provided invaluable assistance and support to the project through their participation on the Basic Course Physical Performance Training Ad Hoc Committee:

Sgt. Chris Beatty, Los Angeles Sheriff's Department
Barry Brodd, NCCJTES - Santa Rosa Training Center
Ron Burns, Modesto Regional Criminal Justice Training Center
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POST staff members who played a key role in the project included:

John Berner, Ph.D.	-	Chief, Standards and Evaluation Services Bureau
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Finally, the following individuals are deserving of special recognition for their contributions to the project:

Edmund M. Bernauer, Ph.D.	-	Exercise Physiologist University of California, Davis
Susan Aitkens	-	Staff Research Associate University of California, Davis
Greg Dossey	-	Los Angeles Police Department

These individuals performed the technical-physiological analyses which made it possible to translate the requirements for performing critically important police physical job tasks into job-related tests and job-related physical training program content. In addition, these individuals drafted major sections of this manual.

Finally, special thanks are due to the Department of Physical Education at the University of California, Davis and the Los Angeles Police Department for providing expert assistance in the preparation of this program and manual.

POST BASIC ACADEMY PHYSICAL CONDITIONING PROGRAM

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CHAPTER ONE

INTRODUCTION TO THE POST BASIC ACADEMY PHYSICAL CONDITIONING PROGRAM

A. Goals and Objectives

The POST Basic Academy Physical Conditioning Program is designed to enhance student physical fitness in a manner that will both prepare the student to perform physically demanding police tasks and instill in the student a desire to maintain a high level of fitness throughout his/her career.

These objectives are achieved by means of a three-fold educational process. First, the student is introduced to the goals and objectives of the physical conditioning program and is provided with instruction on the principles of physical conditioning. Second, the student participates in a series of conditioning exercises which systematically address the basic components of physical fitness (cardiorespiratory endurance, muscular strength, muscular endurance, and flexibility). The progression of exercises is dictated in part by the student's "entry fitness level" and the subsequent improvement of his/her physical condition through training. Third, the student receives numerous hours of classroom instruction[1] on the subjects of:

- Physical fitness as a lifetime pursuit
- Low back care
- Nutrition
- Weight management
- Substance abuse
- Self evaluation

It is by design that the focus of the POST Basic Academy Physical Conditioning Program is to provide conditioning training in a manner that is not punitive or mentally stressful, but rather educates and sensitizes the student to the need for a lifestyle of daily physical activity.

B. Background

Several factors led to the development of the POST Basic Academy Physical Conditioning Program. Among these was a growing awareness of the need for a job-related and standardized program of physical conditioning that could be administered on a statewide basis.

Further support for the program resulted from legislation passed in 1982 [PC13510(b)] which required that POST establish job-related entry-level physical ability standards for California peace officers. As a result of this legislation, all cadets within California are

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[1] See *Basic Course Instructor Guide #32 (Physical Fitness/Officer Stress).*

required to successfully complete a battery of physical abilities tests which have been scientifically shown to be representative of actual physical tasks performed by entry-level officers. Since this is a mandated requirement, it is obvious that any physical fitness conditioning program should address the testing issue as a first priority. For this reason, POST's Basic Academy Physical Conditioning Program is designed, in large part, to improve those physical attributes which contribute to the successful completion of the job-related test battery.

Finally, the case for physical fitness in the field of law enforcement grows stronger every year. A number of studies conducted across the nation have shown that law enforcement personnel exhibit average, or in many cases below average, physical fitness levels. One recent study assessed selected physical fitness and body composition variables in a large group of police officers[2]. The results of the study showed, that while the officers tended to improve on physical fitness tests and to exhibit decreased body fat following basic training, these effects markedly reversed shortly following graduation. Even the youngest group studied (20-29 years) showed regression on the physical fitness tests to pre-academy levels and an actual elevation of body fat above pre-academy levels only one year after graduation. The study also found a progressive decline in physical fitness and increased fatness with age. Unfortunately, the stresses of police work are not inclined to decrease in a similar manner, as is evidenced in part by the increased incidence of physical disabilities reported for older officers.

The evidence obtained from the research studies strongly suggests that the individual officer should be encouraged to engage in physical fitness maintenance activities THROUGHOUT LIFE. The physical fitness training program at the academy provides an opportune setting whereby the student can learn the skills and knowledge to guide him/her in the pursuit of a sound lifetime physical fitness program. Accordingly, POST's physical conditioning program incorporates lifelong fitness concepts as a central element.

C. Overall Design of the Program

There are three major components to the conditioning program. The first component consists of a general introduction to the physical conditioning program, including the principles of conditioning and, where feasible, an assessment of each student's physical abilities (pretesting). The results of this assessment are used to inform each student of his/her physical fitness level relative to the other students, and to identify special exercise "targets" for those students who may have significantly higher or lower original levels of fitness than the class as a whole.

The second major component of the program is the physical conditioning. This is organized into one hour sessions, and is described in a subsequent section of this manual. Two physical conditioning programs are offered; one is a 3 day per week program and the other is a 5 day per week program. The choice between the 3 and 5 day per week programs will depend on local academy needs and resources.

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[2] Stamford, B.A., et al. Status of police officers with regard to selected cardiorespiratory and body compositional fitness variables. *Med. Sci. Sport,* 4:294-297, 1978.

The final component of the program consists of the administration of a job-related physical ability test [per PC 13510(b)], which each student must pass in order to demonstrate acceptable physical readiness to perform essential job functions of a patrol officer.

Phase I: Introduction and Initial Assessment

The primary objective of the introduction to the program is to prepare the student to get the maximum benefit from his/her experience in the program. To this end, instruction is provided about the objectives of the program, the exercise activities through which the objectives are achieved, and the conditioning principles that were followed in developing the program. The introductory phase also includes the administration of a battery of general physical ability tests that occurs prior to the beginning of the first actual conditioning session. The test battery is designed to accomplish two objectives. First, scores on the tests are used to evaluate the students' initial fitness levels so that appropriate exercise targets can be established. Second, as stated earlier, and for purposes of providing student motivation, results of the testing are provided to each student in the form of the student's individual scores as well as the average scores for the entire class. Forms are provided on which to convey this information. As the conditioning program progresses, students are encouraged to reassess themselves on these tests and to record their scores in the spaces provided on their initial feedback form. This procedure provides a way for each student to record and be motivated by his/her achievements in the program.

All of the tests to be administered for initial and periodic assessment are described in Appendix A (page 75). Also provided are detailed protocols for administrating the tests and a student feedback form.

Phase II: Physical Conditioning

The two-fold purpose of the conditioning program is to both enhance lifetime fitness and to improve physical job task performance. The one hour training sessions which comprise the actual physical conditioning phase were designed to accomplish these dual objectives, and are described in Chapter Three. Also included in Chapter Three are guidelines for identifying students in need of specialized (or remedial) conditioning.

In addition to the actual physical conditioning, study materials are provided to both alert the students as to the nature and causes of frequently occurring physical disablers, and to inform them of the steps that can be taken to lessen the chances of the onset of such disablers. These materials are presented in Basic Course Student Workbook Series, Learning Domain 32, which is intended to serve as the basis for the instruction that is to be provided to the students during the initial five weeks of the program. Time over and above that needed for conditioning is to be provided for this purpose. Basic Course Student Workbook for Learning Domain 32 is referenced in Chapter Four.

Phase III: Final Assessment

The final component of the conditioning program consists of the administration of a job-related physical ability test battery. The purpose of the final assessment is to assure that each student is physically ready and capable of effectively performing the physically demanding tasks required of patrol officers. Each student must achieve a passing score on the final assessment in order to successfully complete the POST-certified basic course. The test battery utilized for the final assessment must be either:

- the POST job-related Work Sample Test Battery, or
- a job-related physical ability test which has been approved by POST.

A complete description of the POST job-related test battery appears in Chapter Five. Also in Chapter Five is a copy of the POST Guidelines for Evaluating Alternative Physical Ability Tests.

The requirements that all graduates of the POST Basic Course complete a physical conditioning program and pass a job-related physical abilities test at the conclusion of the physical conditioning program are specified in Commission Procedures D-1-3(b)(7) and D-1-3(b)(8)[3]. They read:

D-1-3(b) (7) Physical Conditioning Program. Students must complete the POST physical conditioning program as described in the Basic Academy Physical Conditioning Manual - 1996.

D-1-3(b) (8) Physical Abilities Test Battery. At the conclusion of the POST physical conditioning program, students must pass a POST-developed physical abilities test battery as described in the Basic Academy Physical Conditioning Manual - 1996. The use of alternatives to the POST-developed physical abilities test battery is subject to approval by POST. Course presenters seeking POST approval to use alternative tests shall present evidence that the alternative tests were developed in accordance with recognized professional standards and that the alternative tests are equivalent to the POST-developed tests with respect to validity and reliability. Evidence concerning the comparability of scores on the POST-developed tests and the proposed alternative tests is also required.

D. Program Development

Job Relatedness Basis

The POST Basic Academy Physical Conditioning Program is highly job-related -- i.e., the contents of the program are demonstrably related to performance of essential patrol officer job functions. In order to achieve this high level of job-relatedness, two analytical procedures were employed in developing the program: Physiological Analysis and Job Analysis.

Physiological Analysis is an analytical process for identifying physiological, mechanical, and other bodily processes which are required to perform physical work. Necessarily, a precise description of the physical work must be available before a physiological analysis can be carried out. In order to provide this description, POST carried out a statewide job analysis which systematically identified and described all the common patrol tasks that require officers to engage in significant physical activity.

Physiological Analysis was applied to those physical patrol tasks (i.e., work) which were determined to be (1) common throughout the state, and (2) of critical importance in all agencies. These tasks are called work samples because they are representative samples of

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[3]The cited procedural references refer to the "Standard Format" of the Regular Basic Course. Identical requirements exist for the "Reserve Format" and the "Transition Program-Pilot Format -- See Commission Procedures D-1-3(c)(4)(H), D-1-3(c)(4)(I), D-1-3(d)(7),and D-1-3(d)(8).

common/critical tasks actually performed by patrol officers. The work samples which were subjected to Physiological Analysis for the purpose of identifying job-related training content are as follows:

AGILITY RUN	-	RUN AT LEAST 99 YARDS, GOING AROUND, OVER OR BETWEEN MINOR OBSTACLES (but not under obstacles or over tall obstacles).
BODY DRAG	-	RAPIDLY DRAG A NONRESISTING PERSON AT LEAST 32 FEET (no assistance from others).
CHAIN LINK FENCE	-	RAPIDLY CLIMB A 6-FOOT CHAIN LINK FENCE HAVING FOOTHOLDS OR HANDHOLDS
SOLID FENCE CLIMB	-	RAPIDLY CLIMB A 6-FOOT SOLID FENCE/WALL HAVING NO FOOTHOLDS OR HANDHOLDS
500 YARD RUN	-	RUN AT LEAST 500 YARDS (equivalent to 1 lap plus 60 yards of a standard running track; continuous run with few or no obstacles)
COMBATIVE ACTIVITY	-	Three combative work samples were identified that represent "typical" on-the-job situations involving resisting subjects. These situations were developed into scenarios that describe what an officer typically reported in dealing with a resisting subject. A description of each scenario is presented in Appendix B (page 89).

Lifetime Fitness Basis

The POST Basic Academy Physical Conditioning Program is also designed to prepare and encourage the student to stay active and fit throughout his/her career and lifetime. This goal stems from current knowledge about the average fitness levels of peace officers and the related high incidents of disability. Today, many law enforcement agencies anticipate losing a significant number of their officers for health related reasons such as lower back dysfunction, ulcers, heart disease, stroke and similar stress-related problems.

Over and above the significant and sometimes incalculable personal loss experienced by an officer who becomes disabled, the loss to the employing agency is often great. In those instances where the officer can no longer work, there is the loss of experience and know-how gained over a prolonged exposure to the social and economic characteristics of a community; such experience is probably not replaceable, since each officer has had unique involvement with the people and places he/she patrols. There is also significant monetary loss to the agency in the form of medical bills, overtime, increased insurance premiums, legal fees, early retirement payouts, and the costs of selecting and training replacements. One large agency, for example, recently projected that it will incur a $1.8 million liability for each officer lost to disability retirement.

Officers who are not disabled, but who are nevertheless physically unfit, also represent a significant burden to agencies in the form of performance losses that can occur when

physically unfit officers begin to realize their diminished physical capability. How many unfit officers avoid or ignore both emergency and routine situations that may require significant physical readiness?

POST believes that a great deal of such disability and loss could be prevented if officers maintained even a minimal level of physical fitness. Accordingly, a major focus of POST's conditioning program is upon lifetime fitness and the prevention of disability. Several classroom instructional objectives, presented in Chapter Four, cover a variety of fitness concepts, such as diet, nutrition, weight control, exercise and stress management.

In addition to the classroom instruction, a significant portion of the student exercise program is devoted to cardiovascular fitness; that is, conditioning of the cardiovascular and cardiorespiratory systems. These components of the exercise program are not based on the results of the previously described job analysis regarding performance of specific job tasks as much as they are on an extensive body of research which indicates that poor cardiovascular and cardiorespiratory condition can contribute to stress-related disability (e.g., heart disease, ulcers, stroke). An important objective of the conditioning program, then, is to bring about an appropriate level of aerobic fitness and to teach the student how to maintain this level throughout his/her career.

Instructors who administer the conditioning program should keep the goal of career-long, lifetime fitness in mind at all times. In this regard, it is extremely important that the student leave the academy with a <u>POSITIVE ATTITUDE</u>, about physical fitness and personal conditioning programs. Whether or not this positive attitude is instilled is highly dependent upon the student's experience in the academy and upon the attitude of the academy staff.

History has shown that it is not difficult to "whip" a person into shape. Exercise hard enough and long enough, and anyone's condition will improve. But, once the desired conditioning level has been achieved, how do we assure that people will maintain that level? Research has shown that we have not achieved this objective very well -- particularly in law enforcement.

Today, the majority of Americans acknowledge the need for, and are aware of the benefits to be derived from, physical exercise programs. Many people, however, report negative feelings about conditioning programs and tend to avoid regular exercise. Such feelings are frequently traceable to adverse earlier experiences in mandatory grade school, high school, or military physical education classes in which they were screamed at, subjected to ridicule or otherwise intimidated by their instructors. Consequently, many people associate pain, embarrassment and negative or hurt feelings with exercise. It is not surprising, then, that exercise has been seldom pursued for its own sake.

As administrators of the POST Basic Academy Physical Conditioning Program, academy staff will have a significant impact on the students' long term feelings and attitudes about physical exercise. The greater the amount of encouragement and support provided by staff, the greater the likelihood that students will adopt an active life style after graduation.

CHAPTER TWO

ESSENTIAL BACKGROUND INFORMATION FOR PT INSTRUCTORS

(READ THIS CHAPTER!)

This chapter contains essential background information which the instructor needs to effectively administer the conditioning program and to establish credibility with the students. An understanding of this information is very important to the successful implementation of the program.

A. Conditioning Objectives

The Job Analysis and subsequent Physiological Analysis (discussed in Chapter One) resulted in the identification of certain physiological demands that must be met before the work samples can be performed. Two of these demands are addressable as conditioning objectives in the conditioning program[4]. They are:

- o Muscular Strength/Endurance
- o Musculoskeletal Flexibility

These demands, along with "cardiovascular endurance," were established as the primary objectives of the physical exercise program. Although cardiovascular endurance (sometimes referred to as aerobic capacity) was not found to be strongly predictive of performance on any of the work samples, it was established as a primary objective on the basis of its contribution to overall physical fitness and the need to prepare students to pursue all aspects of fitness as a lifelong goal. Each of the conditioning objectives is discussed below.

Muscular Strength/Endurance

Muscular strength is the capacity of the muscle to exert force against a resistance. Specifically, it is the "peak tension" that the muscle can generate against an external load. Strength training is based upon the overload principle. This means simply that continued improvement in strength is made possible only by graduated increments in the load or tension of the muscle group. Overload is accomplished in this program by the addition of weight and/or slowing the rate or tempo of movement; slowing the tempo of movement increases the tension developed by the muscle.

Muscular endurance is defined as the capacity of muscle to exert a force repeatedly. The development of muscular endurance is dependent primarily upon imposing an incremental overload of repetitions, as opposed to strength training which requires increasing the "weight" moved, or cardiovascular endurance training which is dependent upon maintaining one's heart rate in a "heart rate training zone" for a minimum period of time.

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[4] A third demand, neuromuscular coordination, was also identified but was deemed to be more appropriately addressed in other specific police-related skill development activities, e.g., self defense techniques.

Musculoskeletal Flexibility

Musculoskeletal Flexibility refers to the range-of-motion through which limbs or body parts are able to move. Decreased range-of-motion limits the ability to perform certain movements and has been associated with increased injury, pain and low back problems. The limits of flexibility are imposed primarily by the tough connective tissue that covers muscles, but also by the joint capsule, the skin and the tendons. Flexibility is improved through stretching exercises. Stretching gradually leads to minor extensions in the connective tissue, and the summation of these minor changes results in improved range-of-motion. The conditioning program contains specific exercises designed to improve flexibility.

Cardiovascular Endurance

The ability of the body to utilize oxygen depends upon the functional efficiency of the cardiovascular system, i.e., the heart, lungs, and blood vessels. The largest amount of oxygen that a person can consume per minute is called maximal oxygen uptake, and this maximal oxygen uptake is frequently referred to as aerobic capacity. Aerobic capacity is a functional measure of cardiovascular fitness. Regular vigorous endurance exercise can increase aerobic capacity by as much as 15 to 25%; the precise amount of increase depends upon six factors:

- intensity	-	the heart rate level that the individual maintains while exercising
- duration	-	the length of time that the individual performs the exercise at the training intensity
- frequency	-	the number of conditioning sessions per week
- pretraining fitness status	-	the aerobic capacity of the individual at the beginning of the program
- mode of exercise	-	the type of activity being performed (e.g., jogging, swimming)
- program length	-	the number of weeks, months, years that the individual continues in the conditioning program

The conditioning program contains three cardiovascular activities: "Distance Running", and two aerobic exercise circuits (one with weights and one with calisthenics). All three incorporate the six factors listed above. A description of each factor is presented below. A detailed summary of the research on these factors, compiled by the American College of Sports Medicine, is presented in Appendix C (page 95). These factors should be communicated to students.

Intensity. According to physiologists, the intensity of exercise must be adequate for a training effect to take place. Training below an adequate intensity level is unlikely to produce a training benefit. On the other hand, an excessively high training intensity is counter-productive, often leading to injury.

For cardiovascular exercise, the appropriate intensity is usually based on measurement of the heart rate during exercise. This is based on the fact that oxygen uptake and heart rate are related to each other in normal, healthy individuals. This relationship is shown in Figure 1.

Since it is very difficult to directly measure oxygen uptake under field conditions, the training heart rate zone is used as a guideline so that the intensity of exercise is sufficient to produce a training effect in the working muscles and cardiovascular system.

Based on existing evidence compiled by the American College of Sports Medicine, each individual's training heart rate zone (training intensity) is between 60 to 80 percent of his/her aerobic capacity. Training intensity below 60 percent of aerobic capacity produces less than optimum benefit, while training intensity above 80 percent produces very little additional benefit over that achieved by training within the 60-80 percent zone. The procedure for determining student training heart rate zones based on maximum heart rate is presented in a following section (page 20).

Duration. Evidence indicates that the duration of continuous aerobic activity should be between 15 and 60 minutes. Duration is dependent upon the "intensity" of the activity. Thus, lower intensity activity should be conducted over a longer period of time. Because of the importance of the "total fitness" effect and the fact that it is more readily attained in longer duration programs, and because of the potential hazards and compliance problems (i.e., attitude and overuse injuries) associated with high intensity activity, lower to moderate intensity activity of longer duration is preferred for adult non-athletes. However, the evidence also indicates that "beginning" joggers tend to incur increased foot, leg, and knee injuries when training is performed more than three days per week and longer than 30 minutes duration per exercise session. For these reasons the duration selected for the distance running begins at 15 minutes and extends out to 40 minutes as students become more fit.

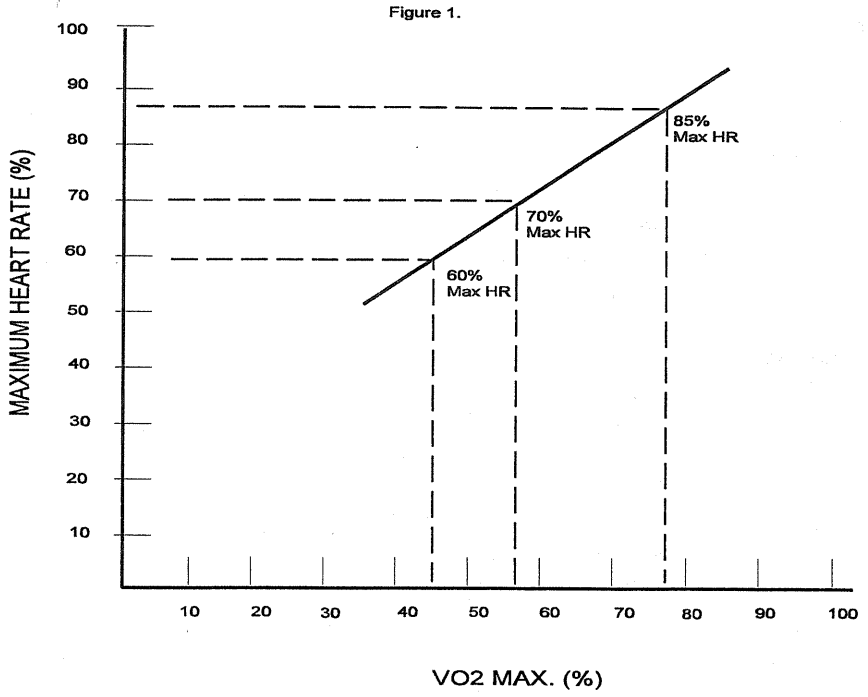
Frequency. Research also indicates that aerobic capacity tends to plateau when frequency of training is increased above three days per week, and that participation of less than two days per week does not show an adequate change in aerobic capacity. The conditioning program is based upon a minimum of 3 aerobic exercise sessions per week.

Pretraining fitness status. Initial level of fitness is another important consideration in cardiovascular training. The student with a low fitness level can get a significant training effect with a sustained training heart rate as low as 110-120 beats per minute, while persons at higher fitness levels need a higher threshold of stimulation. The importance of initial aerobic capacity is that instructors should expect variation in the student class and be prepared to modify the target performance levels accordingly. Students with low initial aerobic capacities will gain very little additional training benefit if forced to keep pace with the individuals of much higher cardiovascular endurance. Likewise, a deconditioning effect may occur in highly fit students if worked at the threshold intensity of poorly fit individuals.

Mode of Exercise. Any activity that can be maintained and that involves the continuous use of large muscle groups is a suitable exercise for developing cardiovascular endurance. Examples include running, jogging, brisk walking/hiking, swimming, skating, bicycling, rowing, cross-country skiing, rope skipping, and circuit training. Running and circuit training are the modes utilized in the conditioning program, thereby precluding the need for specialized equipment or facilities.

Program Length. The minimum length of the POST Basic Academy Physical Conditioning Program is ten weeks. This time span will be sufficient for most students to improve and to achieve an acceptable level of cardiovascular fitness. Recall, however, that lifetime fitness is a central goal of the conditioning program. From this perspective, aerobic conditioning activity should be stressed as a lifelong pursuit and instructors should make every effort to assure that students leave the academy with the knowledge and motivation to carry on a lifelong personal aerobic program.

Figure 1.



The relationship between percentage of maximum heart rate and oxygen intake (VO_2 max).

Benefits of Cardiovascular Conditioning

With regular cardiovascular conditioning, the following benefits may be expected:

CARDIOVASCULAR FUNCTION

Reduced resting heart rate
Reduced heart rate for standardized submaximal exercise
Accelerated rate of heart rate recovery after standardized exercise
Increased blood volume pumped per heart beat (stroke volume)
Increased size of heart muscle (myocardial hypertrophy)
Increased blood supply to heart muscle
Increased strength of contraction (contractility)

NEURAL, ENDOCRINE, AND METABOLIC FUNCTION

Increased glucose tolerance
Increase enzymatic function in muscle cells
Reduced body fat content (adiposity)
Increased muscle mass (lean body mass)
Reduced physiological strain resulting from psychological stress
Increase maximal oxygen uptake

PSYCHOLOGICAL FACTORS

Improved self-image
Increased personal satisfaction
Improved sense of well-being

B. Principles of Conditioning

Research has shown that there are a number of well-established general physical conditioning principles. An understanding of these principles is necessary in order to effectively administer the program. These principles, which are enumerated below, should be communicated to the students so that they may gain an understanding and appreciation of the program; knowing the "why" behind the program will enhance acceptance of, and motivation to perform, the program. Specific application of these principles to cardiovascular training has been previously discussed.

1. Individual Differences/Pretraining Fitness Status. Because of such factors as size, heredity, nutrition, and age, people entering the basic academy will almost always vary in their initial level of physical fitness. It is important to be aware of these differences since an individual's initial level of fitness will have a marked effect on his/her potential to improve. The closer an individual is to his or her maximal capacity, the more difficult it is to make substantial improvements. Likewise, the unfit individual can normally make very large gains in response to appropriate training stimuli. Since it is obvious that individual differences do exist, it is logical to take them into account during physical training so that the individual can benefit maximally from an appropriate exercise dosage. This is one of the reasons for the initial assessment of student fitness at the beginning of the conditioning program. The results of this initial assessment allow many of the conditioning exercises to be based on the individual's initial fitness level and progress from that point forward with training.

2. Specificity of training refers to the fact that exercises utilized to accomplish a particular conditioning objective are specific to that objective and have little or no effect on any other objective. For example, performing as many crunches as possible in two minutes on a regular basis will dramatically improve muscular endurance, but it will do very little to improve peak strength. Likewise, touching one's toes will increase flexibility, but will have little effect on aerobic capacity. This is one of the most important principles of training, and is strongly reflected in the various activities selected for inclusion in the physical conditioning program. Each activity was chosen to meet a specific objective.

3. Frequency of training is another important consideration. Most recommendations specify that the training frequency be at least three times per week for significant improvement. Additional benefits occur if the frequency is increased to five times per week. Detraining is likely to occur with fewer than three sessions per week. The minimum POST Basic Academy Physical Conditioning Program utilizes a schedule based on three conditioning sessions per week.

4. Overload refers to placing increased demands upon the various systems to produce continued improvement. With regard to muscular strength, for example, lifting the same amount of weight throughout the course of the training program will not continue to produce significant improvement. To reap maximum benefits, the amount of weight lifted should be increased in a progressive fashion. There are many methods of imposing progressive overload, both for the purpose of strength

improvement or other training objectives such as cardiorespiratory endurance. Overload is a critically important factor in any physical conditioning program. Regardless of the frequency or specificity of the exercise, an insufficient training stimulus will not improve a person's condition. In fact, loads which fail to place sufficient demands on the body usually lead to deconditioning -- i.e., a loss or decrement in condition.

Appropriate overload criteria appear for every activity in this conditioning program. These criteria, which are referred to as "targets," were developed on the basis of selected empirical studies and projected reasonable "target" levels for the average young adult trainee. Overload criteria are generally incremented every two weeks throughout the program.

5. Intensity is an application of the overload principle and refers to the level at which the individual is exercising. An individual needs to train at a certain intensity level (threshold) for improvement to occur. The term "intensity" is normally used when the overload criteria involves pace or speed (as opposed to weight or repetitions). For example, an Olympic caliber runner will receive little or no benefit from walking a mile because the training intensity is far too low. Likewise, training at an inordinately high intensity level can also result in less than optimal training benefits. Intensity can be monitored in a number of ways such as by using heart rate (cardiorespiratory training) or counting repetitions or sets in a fixed time interval (strength training).

6. Duration of exercise refers to the length of time that one exercises at a given intensity. It is directly related to overload/intensity. For example, running at 95% of maximal heart rate can only be sustained for a brief period of time, while jogging at 70% of maximal heart rate can be sustained for a much longer period of time. In order to produce a cardiorespiratory training stimulus, exercising for at least 15-20 minutes in the training heart rate zone is recommended.

7. Mode of training refers to the different types of training activities that can be used to achieve the same objective. For example, swimming and running are excellent activities for achieving cardiovascular endurance, as are cycling, aerobic dance, and cross-country skiing.

8. Enjoyment of training is perhaps the most important consideration. If the pursuit of physical fitness is enjoyed, it is more likely to be continued. One of the most important goals of this physical conditioning program is to provide the student with the satisfaction and confidence to pursue a lifetime physical fitness program. Clearly, this is a tough task if the academy physical training program is made unpleasant. On the other hand, significant fitness gains require significant persistent effort. If the positive results of training are reinforced through an understanding of the health-related benefits achieved, students are much more likely to continue to pursue lifetime fitness as a personal goal. One way to further increase the likelihood that the goal of lifetime fitness will be pursued is to introduce the student to a variety of exercise activities. A list of "lifetime fitness activities" can be found in Appendix D (page 107).

9. Plateauing or failure to sustain progressive improvement is a phenomenon that tends to occur in an individual after a period of improvement and may be due to a number of factors. This period is generally short-lived and improvement is once again noted. Students who complain that they are not improving should be reminded of this principle and encouraged to continue their efforts.

10. Deconditioning occurs when the training stimulus either ceases or falls to a sufficiently low level. At this point, the gains made during training begin to fade and will continue to do so until an adequate training stimulus is reinstated.

Research indicates that levels of endurance, strength and power are reduced once training stops. However, the trend is for the reductions to be smaller during the first weeks following cessation of training. It is, therefore, very important to encourage students to begin an independent self-directed program of regular exercise immediately following the conclusion of the academy program.

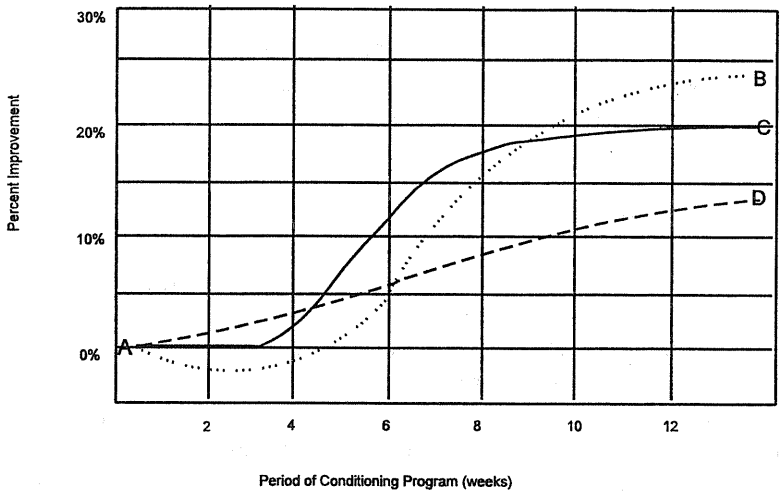
Also, since the exercise activities included in the conditioning program are based on the principles enumerated above, it is equally important to maintain the progression of exercises as specified in Chapter Three.

C. Adaptation to Chronic Exercise

Individuals who have not been involved in a program of regular vigorous exercise, although capable of meeting initial target performance levels, often are unable to keep pace with the initial target increases projected in the exercise tables. Certain individuals, and particularly those who have maintained a sedentary lifestyle, will show a possible decrement in performance during the first three or four weeks of the program. The reason for this apparent loss in ability (strength, flexibility, endurance, etc.) is that their bodies undergo a transitional adaptation that often requires a longer period of time to adjust than that for active individuals. Consequently, academy staff should expect a certain portion of their class to perform poorer than anticipated during the first three to five weeks. Students who show this pattern of performing below their initial levels should be apprised of the adaptive changes taking place within their system and be given as much encouragement as possible. Instructors should monitor such individuals closely and not demand too much of them too soon. The curves shown in Figure 2 depict the likely rates of improvement for "accelerated", "average", and "remedial" trainees where the remedial trainee is assumed to be starting the program from a very sedentary lifestyle.

Figure 2.

Differences in relative training progression during a 12-week training program for persons with different initial fitness levels.



The general progression of training projected in Figure 2 is charted in percent units of change from an initial common point representing the initial fitness level. These projections are based on the overload principle utilizing well-established physical training methods and activities. Referring to the above:

"A" Represents the initial fitness level of the group and is the reference starting point for the training program.

"B" Represents the progress projected for the below average remedial group of students who have not been involved in regular vigorous exercise. Note the initial decline in progress followed by a rapid increase. Because of their lower starting level, this group can ultimately achieve the largest percent improvement in the program.

"C" Represents the average rate of progression for the student class. Note the slow early improvement and accelerated progress in the middle weeks followed by a tapering off in the last two weeks.

"D" Represents the projected training progress for the above average student group. It proceeds at a faster initial rate owing to the group's above average fitness. This group should be expected to improve and not be held back by less fit students. The percent change expected for this group is not as great as the other groups because of the group's superior initial condition.

D. Signs and Symptoms Associated with Exercise Training

Physical training has a certain degree of discomfort associated with it. However, both the student and the physical training instructor need to be sensitive to early warning signs of "overuse" injury. Mottos such as "no gain without pain" and "you have to learn to run through pain" although well-intentioned with respect to the accompanying discipline of physical training, are two-edged swords. A basic distinction must be made between the discomfort of exercise exertion and pain. Discomfort or transient distress is a natural phenomenon which accompanies all training. On the other hand, pain is symptomatic of a physiological disorder and should not be ignored, particularly if it persists through exercise and following exercise.

The object of the conditioning program is to improve the physical capacities of the body and to experience the confidence and control that are associated with physical fitness. Overtraining leading to "overuse" injury is counterproductive to these objectives.

Perceived exertion during exercise

When engaged in continuous activities such as jogging or intermittent activities such as circuit training, it is important to maintain a balance between the minimal exertion needed to cause a training stimulus and excessive exertion which can lead to prolonged fatigue or, in some cases, injury. Each student should acquire the knowledge necessary to effectively monitor his/her exercise level and understand the recovery indices that are necessary for sound physical training. If consistently applied, this knowledge will result in significant development while minimizing associated distress and risk of injury.

Respiration rate and pattern are the primary indicators of exertion. Exercise will raise the rate of breathing which is necessary for effective training, however, once students find that they are unable to voluntarily control the rhythm and pattern of breathing (i.e., they begin to pant) they should reduce the effort until controlled breathing is restored. This does not mean stop.

When exercising, it is natural to breathe in and out of both the nose and mouth.

Whenever dizziness or nausea are experienced, students should stop and walk until they recover. These symptoms may be associated with copious sweating and rapid heart rate. Under the latter circumstances, it is advisable to terminate exercise at once. Students with these symptoms should inform their physical training instructor immediately.

Students who experience "persistent" muscle pain, particularly in the legs, or joint pain during exercise, may be experiencing "overuse injury". Under these circumstances they should stop the exercise and monitor the pain. If it disappears, the workout may be modified by engaging in an alternative type of exercise modality, e.g., stationary cycling could be substituted for a running activity.

Sports Medicine

Sports injuries can be categorized into 3 stages based on pain, when it occurs, and when it goes away. The degree of treatment (i.e., self first aid/therapy vs. professional medical aid) sought can be determined by using these stages as a gauge:

1ST STAGE	Pain during the activity but it goes away when activity ceases or soon after.

Proper self treatment usually works well at this level.

2ND STAGE — Pain during the activity that lingers on after the activity ceases . . . and diminishes within a day or two, and is gone before the next exercise session.

Self treatment when recovery cycle is short BUT, at this level it is time to start thinking about seeing a physician if the pain is not resolved within 3 - 4 days.

3RD STAGE — Pain during the activity that does not go away even after days of rest (constant pain that impairs normal movement, pain that is distracting, perhaps keeps person awake at night).

Self-treatment is definitely out of the question, medical attention should be sought immediately.

EXCEPTIONS:

Any loss of consciousness, any accident or fall where a limb or joint has to be immobilized, any heat related injury to the victim or any case where the student complains of chest pains accompanied by radiating pain down the left arm and/or difficulty in breathing SHOULD PRECIPITATE AN IMMEDIATE MANDATORY MEDICAL REFERRAL AND EVALUATION.

Causes of Injury

There are 2 common causes of student injury.

- The student was not paying attention to the environment (e.g., trips on rock, steps in pothole, etc.; or student fails to maintain equipment properly, such as worn out running shoes).
- The student was doing too much work (in terms of quantity or intensity) for his/her level of fitness and was doing it too soon in the conditioning program.

Students should be told about these factors and reminded to pay attention to their surroundings during strenuous PT. Instructors should also remind students that "Zoning Out" mentally during a long run, for example, could cause them to suffer an injury that would prevent them from graduating. Students should be instructed to report all injuries to their instructional staff immediately and should be required to provide evidence of medical fitness for training when the instructor has doubts as to the student's ability to safely perform. Instructors should be required to document, in writing, details associated with any student injury which causes loss of time from the program.

Students should not only be familiar with when to "Self-Treat" their injuries but HOW to do so. The best and simplest advice to give students is to use the "R. I. C. E." method:

R = REST: most students will not have much latitude in this area but, if they do, they should cut way back or stop exercise altogether for 4 - 7 days. All extracurricular activity should temporarily cease.

I = ICE: most therapists and sports medicine physicians today recommend ice (to minimize swelling and promote healing) for at least the first 72 hours after the injury; in fact, there is a growing number of physical therapists and sports doctors who recommend using ice throughout the injury cycle. Heat attracts blood and extracellular fluids to the injury, the resultant edema (swelling) may retard the recovery rate.

C = COMPRESSION: an elastic bandage around the injured area that can reduce the dynamic forces causing the injury (e.g., shin splints) as well as prevent swelling. However, make sure "Ace Bandages" are not so tight that they cut off circulation.

E = ELEVATION: when and where possible, the injured area should be elevated to a position above the level of the heart to prevent unnecessary edema (swelling) due to fluid build up in the injured part. This should occur several times during the day.

Finally, the student needs to know what kinds of injuries commonly occur and what contributes to their development. Presented below is a brief list of some of the more common injuries and a note concerning cause and prevention:

Pulled Hamstrings. Usually occurs during sprints, the result of explosively contracting a cold and tight muscle. Stretch thoroughly prior to sprinting.

Groin Pull. Usually caused by using interior muscles to pull yourself over an obstacle (e.g., a wall), or running with the toes pointed outward. Point toes straight ahead on distance runs.

Side Stitch. Usually caused by a poor breathing pattern. Instruct students to relax their abdomen when inhaling and contract abdomen when exhaling (like squeezing the air out); within 10 - 15 breaths the stitch will disappear. The cause of the side stitch is unclear; some researchers feel that this syndrome is caused by food ingested too close to the exercise session, while others feel that it is the result of a spasm or cramp in the diaphragm produced by abnormal breathing. Side stitches are frequently brought on due to poor warm-up or too early a fast pace.

Muscle Soreness, Sprains, and Strains. Soreness, usually due to exercise after long inactivity, may be caused by microscopic tears in the muscle or connective tissue, or to contractions of muscle fibers. It is almost impossible to avoid soreness when beginning an exercise program; however, it can be minimized by starting with moderate workloads and increasing those loads gradually and carefully. Beginners, as well as experienced exercisers, should stretch before and after work-out sessions.

Muscular soreness resulting from minor strains due to overexertion is experienced by every

athlete occasionally. Mild soreness which appears gradually, eight to twenty-four hours after exercise, is of no serious concern and may be treated by simply reducing or eliminating the stress on the affected muscle for a few days. More intense pain, especially pain which appears suddenly during exercise should receive prompt attention.

Whenever muscle or joint pain appears during a workout session, the activity should be discontinued immediately. Exercising through pain will do no good from a training standpoint and is almost certain to further damage the involved area. Also, compensating for the injury while continuing a workout invites another injury in a different area of the body because of the abnormal stress. Ice should be applied to the injured area as soon as possible after the onset of pain. Avoid placing the ice directly against the skin--the pain resulting from excessive chilling of the skin will limit the application time. Long term cooling of the injured tissue is the goal, not sudden and intense chilling of the skin surface. Paper cups filled with water and stored in the freezer have been found to be useful for prompt use in the event of athletic injuries. Apply ice to the injury for twenty to thirty minutes, followed by a fifteen minute rewarming of the tissue. Repeat this process for three to four hours.

Light compression and elevation of the injured area will greatly aid in preventing the accumulation of fluid in the injured tissue. It is this accumulation of fluid--or edema--which prolongs the pain and retards the healing process.

If the pain and swelling increase despite the treatment, consult a physician. These symptoms may indicate that the injury is more serious than it first appeared. However, experts agree that ice as an initial treatment can do no harm and may be of great benefit, no matter how serious the injury.

Repeated muscle or joint soreness in the same area should not be ignored. Such chronic pain probably indicates inadequate or improper warm-up or stretching or incorrect exercise technique or equipment.

Muscle Cramps. Cramps are powerful involuntary muscle contractions. Immediate relief comes when the cramped muscle is stretched and massaged. Cold muscles seem to cramp more readily; therefore, it is always wise to warm up before vigorous effort.

Bone Bruises. Joggers sometimes get painful bruises on the bottoms of the feet. Such bruises can be avoided by careful foot placement and by using footgear of good quality. Cushion inner soles also help. A bad bruise can linger, delaying an exercise program many weeks. There is no instant cure once a bruise has developed, so prevention is the best advice. Ice may help to lessen discomfort and hasten healing. Padding may allow exercise in spite of the bruise.

Ankle Problems. A sprained ankle should be iced and elevated immediately. An ice pack in the first few minutes may greatly reduce the disabling effects of the sprain. A serious sprain should be examined by a physician. Ankle wraps and tape may allow exercise after a sprain, but prevention is a more prudent course.

Achilles Tendon. The Achilles tendon, which connects the heel to the calf muscle, is a notorious weak point in the human physiology. This tendon is easily injured in vigorous athletic activity. Careful stretching before and after exercise, and selecting good quality athletic footwear are both important in protecting this vulnerable tendon from injury. Once injured or inflamed, the Achilles tendon may take weeks or months to return to normal. An ice pack for about six minutes helps, but continued activity could lead to partial or complete

rupture if left untreated or abused.

Lower Leg Pains (Shin Splints). Pain in the lower portion of the shin bone is known as shin splints. Although shin splints is usually a minor injury, the condition can, if not properly treated, become a chronic irritation which seriously interferes with training. Rest is the best cure for shin splints, although taping or a sponge heel pad seems to help in some cases. Preventive measures include exercises to strengthen shin muscles, gradual adjustment to the rigors of exercise, running on softer surfaces, occasionally reversing direction when running on a curved track, and using the heel-to-toe footstrike.

Blisters. Few runners can say that they have never had a blister, but the likelihood of developing a blister can be reduced by wearing good, properly fitting shoes. At the first hint of discomfort, cover the areas with some moleskin or a large bandage. If the blister does not reabsorb, and as a last resort, puncture that edge with a sterilized needle to drain the accumulated fluid, treat with an antiseptic, cover with gauze, circle with foam rubber, and go back to work. It is wise to keep the items needed for blister prevention at hand.

Knee Problems. The knee is one of the least efficient joints of the human body. If persistently abused, the knee is subject to several forms of injury and deterioration. The first line of defense against knee injury is strength. A knee which is supported by strong, well-conditioned muscles is stable and able to withstand stress better than a weak knee. Some athletic activities are particularly damaging to the connective tissue in the knee joint. The full squat, especially while supporting a weight, is a very dangerous exercise; the half squat is much safer. Injuries to the knee can also result from an activity as simple as running. In brief, careful strengthening of the knee and using proper exercise techniques and equipment are the most effective safeguards against injury. Persistent knee pain should never be ignored. Those experiencing knee discomfort should consult an orthopedic physician who is skilled in sports medicine.

Heat and Exercise

At moderate temperatures the body heat generated by exercise or work is easily dissipated. As temperatures and humidity increase, the temperature-regulating mechanisms increase perspiration rate to keep the body temperature from climbing above tolerable limits (about 102.5°F). As perspiration evaporates, it cools the body. When humidity is high, perspiration does not evaporate, and less heat is lost. At that point excessive sweating only contributes to the problem. Perspiration comes from the blood and reduces blood volume. Also, salt and potassium needed by the cells are lost in perspiration. And finally, because perspiring also requires energy, excessive perspiration increases the body's exercise workload.

During work in the heat it is common to lose more than a quart of sweat an hour. During vigorous exercise in a hot, humid environment, sweat rates can approach three quarts an hour for short periods. A good estimate of fluid loss is the body weight difference after work in the heat. Athletes often lose six to eight pounds in a single workout. Adequate replacement of water, salt, and potassium is vital to maintain exercise or work capacity and to avoid heat cramps, heat exhaustion, or heat stroke.

The typical American diet, even when no salt is added to food at the table, contains many times more salt than the body can use under almost any workload. Therefore, for most people, no increase in salt consumption is necessary, and such an increase may be harmful. Avoid the use of salt tablets. Exercise during warm, humid weather should be

accompanied by increased fluid intake. Fruit juices are beneficial because fruits and vegetables are excellent sources of the potassium and minerals which must be replaced. Note: This suggestion refers to real fruit juices, not juices which are artificially sweetened or flavored (read the label).

The body adjusts or acclimates to work in the heat. Gradual exposure to exercise in a hot environment leads to changes in blood flow, reduced salt loss, and increased perspiration. After five to seven days one's heart rate for the same amount of exercise may decline from 180 to 150 beats per minute. Physically fit individuals acclimate more readily to work in the heat, as their well-trained circulatory systems make them better suited to its demands. A recommended procedure to determine the appropriateness of exercise under conditions of heat and/or humidity is given in Appendix E (Page 111).

Altitude and Exercise

Higher elevations impose limitations on work capacity because of reduced oxygen supply. During the first few weeks of exposure to higher altitude the ability to perform is impaired. It can be improved over a period of several weeks by training at that altitude. Altitude acclimatization leads to improved lung function, increased red blood cells and hemoglobin, and increased numbers of capillaries in the working muscles. These changes reduce but never eliminate the effect of altitude on aerobic capacity.

Air Pollution and Exercise

Avoid exercise in a polluted atmosphere. Carbon monoxide takes the place of oxygen in the red blood cells, which reduces aerobic capacity. Air pollution can, over the long term, have the following effects: 1) irritate airways (bronchitis), 2) break down air sacs in lungs (emphysema), and 3) reduce oxygen transport.

Academies in areas with high air pollution may wish to consider using alternate aerobic exercise which can be done indoors. Another option is exercising during the hours of lowest pollution, usually in the early morning.

Illness or Injury

A physical activity program should be modified or stopped during any illness, injury, or infection which might be aggravated by such a program. Use of proper footwear and socks and taking it easy at the beginning will help avoid many potential foot and leg problems. Remember that muscles condition much faster than do tendons, ligaments, and joints. Therefore, slow, gradual increases in exercise workloads are necessary to avoid injuries. Any persistent illness or injury should be brought to the attention of a physician. Never exercise with a fever!

The U.S. Youth Soccer Association has published *A Guide to the Prevention and Treatment of Injuries*, which we have included in Appendix F (page 115). A supplemental reference dealing with this subject is *Modern Principles of Athletic Training* by Klafs and Arnheim (Mosby [Times Mirror Co.], 1988).

E. Calculation of Training Heart Rate for Aerobic Conditioning

In general, heart rate is the best indicator of exertion. Since it is measured easily, it can be used to establish appropriate exercise intensity. It is customary to calculate a range, with

both lower and upper endpoints, where training is likely to be most beneficial. If an individual consistently trains below a certain level, i.e., 60% of capacity, gains will be minimal (insufficient overload). On the other hand, training above a certain level, i.e., 80% of capacity, is difficult to sustain for an appropriate length of time and can lead to injuries.

Heart rate is usually expressed in beats per minute. It is impractical, however, to use this "minute" rate for exercise. An accepted approach is to think in terms of a 10 second period. This is much more practical when applied during an exercise session, as measurement beyond 10 seconds can lead to erroneous estimation since the heart rate falls so rapidly after exercise is stopped.

Measurement of the heart rate, at rest or during exercise, can be taken by palpating the radial (wrist) or carotid (neck) artery. Do not palpate both carotid arteries at the same time. It is important to teach the students how to measure their own heart rate, both at rest and during exercise sessions. This should be a tool that they carry with them to their own personal fitness programs beyond the academy.

The heart rate should be measured after a "steady state" is reached, i.e., after at least 5 minutes of aerobic activity such as running. Once it is measured, it provides feedback in terms of exercise intensity. If the measured heart rate is below the calculated lower end of the training heart rate range, then the student knows to pick up the pace. If it is above the upper end, the student should slow down.

Measurement of actual training heart rate should be performed as follows: While still running, find the pulse in the wrist. Stop briefly and begin counting the pulse for a 10 second time period (a timepiece is required). It is important to begin counting as soon as possible after stopping since the pulse begins to fall immediately. The first count is actually "zero", not "one". Count 0, 1, 2, 3, and so on for the 10 second period. The steps involved in calculating the training heart rate range are shown in the box below.

The calculated training heart rate range, which serves as a guide, is determined as follows:

Step 1.	Calculate your estimated maximum heart rate by subtracting your age from 220.
Step 2.	Subtract your resting heart rate.
Step 3.	Multiply this number by the lower conditioning intensity (60%).
Step 4.	Add your resting heart rate.
Step 5.	Divide by 6 to get your 10-second value (to be used during exercise).
Step 6.	Repeat Steps 3-5 using upper conditioning intensity of 80%.

Example: For a 20 year old male with a resting heart rate of 70 beats per minute:

To find the lower end (60% of capacity) of the training heart rate range:

Step 1.	220	-	20 yrs	=	200
Step 2.	200	-	70	=	130
Step 3.	130	x	60%	=	78
Step 4.	78	+	70	=	148
Step 5.	148	÷	6	=	25 beats in 10 seconds

To find the upper end (80% of capacity) of the training heart rate range:

Step 3.	130	x	80%	=	104
Step 4.	104	+	70	=	174
Step 5.	174	÷	6	=	29 beats in 10 seconds

The Training Heart Rate range for this student would be 25-29 beats in 10 seconds.

Heart rate recovery is often used in circuit training or interval workouts to determine when it is safe to begin the next bout. Generally, when heart rate returns to below 120 beats per minute, it is safe to proceed. Individuals with higher fitness levels can operate at higher recovery rates. Heart rate recovery is both age and fitness related; the fitter individual will recover more quickly, as well as the younger individual.

F. Components of an Exercise Session

Each exercise session in the POST Basic Academy Physical Conditioning Program contains three general components: (1) warm-up, (2) conditioning period, and (3) cool-down. These components are considered to be essential ingredients in the design of any sound exercise program. The significance of each component, as described below, should be communicated to the students so that they may better evaluate the quality of any personal fitness program they may want to adopt after the academy.

The warm-up serves as a preparation for the actual conditioning session. In addition to preparing the body for the upcoming workout, it also helps to protect against injuries and muscle soreness. A proper warm-up should gradually increase the heart rate and blood flow as well as prepare the muscles for more vigorous exercise. The initial phase of the warm-up should consist of exercises that are relatively moderate in intensity, involve the entire body, and cause a gradual (not sudden) increase in heart rate. This should take about three to five minutes and include activities such as walking and/or easy jogging. In addition to preparing the heart and lungs for action, this also increases muscle temperature so that the second phase of the warm-up, stretching, will be more effective. It is better to stretch muscles that are warmed up. Thus, after the general warm-up, a proper amount of time should be spent on stretching. The stretching phase of the warm-up should take about 5 minutes. An effective method of stretching is to slowly stretch until the point of resistance is encountered, holding that position for 10-20 seconds, and then relax. Each stretching exercise should be repeated until the muscle group feels supple. **DO NOT**

BOUNCE and DO NOT STRETCH TO THE POINT OF PAIN. Also, if the weather is especially cool, more time should be spent in both warming up and stretching.

The conditioning period constitutes the main component of the exercise session. It is during this period that the intensity of exercise is increased to produce a training stimulus. The content of the conditioning period is tailored to the specific training objectives. For example, if an objective of a training session is to increase cardiovascular endurance, the conditioning session could include circuit training and/or jogging (details are provided in Chapter 3).

The cool-down is the tapering off period that occurs after the conditioning period. The most important aspect of the cool-down period is a continuation of activity at a decreased intensity. For example, if the conditioning period consisted of running at a vigorous pace, then the cool-down should begin by reducing the pace to a slow jog or perhaps even a fast walk. The general idea is to bring the heart rate down to around 100 or 110 beats per minute within three to five minutes. Following this decrease in activity aimed at gradually lowering the heart rate, it is desirable to finish off with some flexibility exercises for a few minutes. The exercises for cool-down should emphasize the stretching of the primary muscle groups employed during the "conditioning" phase, e.g., for continuous running, stretching should focus on the legs, hips and low back. A properly conducted cool-down will help the body recover from exercise, help to prevent muscle soreness (by facilitating the removal of lactic acid), and improve flexibility.

CHAPTER THREE

POST BASIC ACADEMY PHYSICAL CONDITIONING PROGRAM

A. Minimum Program Requirements

The minimum POST Basic Academy Physical Conditioning Program is described in the 3 day per week schedule found in Tables 1 and 2. The essential elements of this program are as follows:

1. The program must consist of a minimum of **36** sessions;

2. The 36 required sessions must be conducted within a period of 10 to 14 **consecutive** weeks with a minimum of two sessions per week;

3. Each **session** must be a minimum of 60 minutes in length;

4. Each session must consist of a warm-up, a conditioning period, and a cool-down as set forth in the 3 or 5 day per week programs;

5. Each student must participate in a minimum of 30 of the required 36 sessions. (See provision for "make-up" sessions, page 28)

B. Program Safety Guidelines

In order to minimize injuries, the following guidelines, which are taken from the *POST Guidelines for Student Safety In Certified Courses*; (1990) should be followed:

1. Physical conditioning training should be conducted in suitable locations.

   COMMENT: Risk of student injury increases dramatically when training occurs in inappropriate locations.

   Lighting and ventilation are key factors in the selection of indoor facilities suitable for strenuous physical activity.

2. Calisthenic exercises should be performed on shock absorbing, nonabrasive surfaces.

3. To the extent possible, running areas should generally be free from obvious hazards, unbanked, free of excessively steep inclines or declines, and afford reasonable traction.

4. All offsite training locations should be inspected in advance for adequacy of exercise surfaces, lighting, traffic safety, security and related considerations.

5. Restrooms and drinking water should be readily available during all exercise sessions.

6. Presenters should establish minimum clothing and footwear standards for students.

COMMENT: Footwear should offer adequate shock absorption and proper support.

Clothing should be layered to accommodate temperature changes during exercise. Clothing that inhibits evaporative cooling (sauna suits) should be avoided. High visibility or reflective clothing should be encouraged, as conditions warrant, to enhance trainee safety when running.

7. Students should be instructed not to wear jewelry during exercise which may represent a safety hazard.

8. Instructors should have successfully completed the POST Basic Academy Physical Training Instructor's Seminar or an equivalent.

9. Obstacle courses should be inspected for hazards prior to each use.

10. Instructors should follow recognized psychomotor skill training principles in the delivery of training.

    COMMENT: In general, conditioning skills and exercises are best taught by first describing the skill, then demonstrating the skill, and finally having the trainee perform the skill at a reduced speed until some proficiency is achieved. These same principles apply to instruction related to obstacle courses and related test events.

11. Instructors should constantly emphasize proper technique and safety over competitive performance.

    COMMENT: Many injuries occur as a result of overzealous competition among trainees.

12. Prospective trainees should be notified in advance of the physical demands and performance expectations of the physical conditioning program.

13. Appropriate emergency and safety procedures should be established for offsite physical training activities.

    COMMENT: Offsite "runs" and similar activities suggest consideration of chase vehicles with emergency lights, road guards with high visibility or reflective clothing, radio communications, and other appropriate safety considerations.

C. Conditioning Schedules

There are two approved conditioning schedules for the POST Physical Conditioning Program -- a 3 day per week program and a 5 day per week program. The 3 day per week program, when carried out over the required 10-14 week time period, meets the minimum program requirements. The 5 day per week program is provided for those academies that wish to conduct physical conditioning 5 days per week over the required 10-14 week time period. Regardless of whether the 3 or 5 day per week schedule is adopted, POST recommends that academies continue the program beyond the minimum 10-14 weeks when feasible. This will improve fitness, while preventing deconditioning and reducing the risk of injury

associated with deconditioning. The two approved programs are described below.

1. Three Day per Week Program

The 3 day per week conditioning program is described in Tables 1 and 2. Table 1 describes the schedule for the odd numbered weeks (weeks 1, 3, 5, etc.), and Table 2 describes the schedule for the even numbered weeks (weeks 2, 4, 6, etc.).

The warm-up and cool-down phases remain constant (moderate activity and stretching) for all sessions, while the conditioning phase varies (depending on the week and day). For odd numbered weeks (Table 1), the Monday and Friday conditioning phases consist of calisthenics and running. On Wednesday, the conditioning phase may consist of either an Aerobic Exercise Circuit with Weights or an Aerobic Exercise Circuit with Calisthenics. For even numbered weeks (Table 2), the Monday and Friday conditioning phases consist of either the Aerobic Exercise Circuit with Weights or the Aerobic Exercise Circuit with Calisthenics, while the Wednesday conditioning phase consists of calisthenics and running. The specific exercises which make up the different exercise sessions (calisthenics and running, Aerobic Exercise Circuit with Weights, Aerobic Exercise Circuit with Calisthenics) are described on pages 35-39. Whenever an aerobic circuit is called for, the circuit with the weights is preferred.

2. Five Day per Week Program

The 5 day per week conditioning program is described in Tables 3 and 4. Table 3 describes the schedule for odd numbered weeks (weeks 1, 3, 5, etc.), and Table 4 describes the schedule for even numbered weeks (weeks 2, 4, 6, etc.). Again, the warm-up and cool-down phases remain constant, while the conditioning phase varies. For odd numbered weeks (Table 3), the Monday, Wednesday and Friday conditioning phases consist of calisthenics and running, while on Tuesday and Thursday they consist of either the Aerobic Exercise Circuit with Weights or the Aerobic Exercise Circuit with Calisthenics. For even numbered weeks (Table 4), the Monday, Wednesday and Friday conditioning phases consist of either the Aerobic Exercise Circuit with Weights or the Aerobic Exercise Circuit with Calisthenics, while the Tuesday and Thursday conditioning phases consist of calisthenics and running.

D. Program Flexibility

Frequency of Conditioning: As specified in the **Minimum Program Requirements** (see page 25), the 36 required exercise sessions may be conducted within up to a 14 week period provided that at least two sessions are conducted per week. Although permitted, reducing the number of sessions to 2 on certain weeks, and extending the time for conducting the required 36 sessions up to 14 weeks is not encouraged, and violates the "Frequency of Conditioning" principle discussed in Chapter Two. A frequency of 2 sessions per week tends to maintain fitness levels rather than produce significant improvement. Furthermore, conducting fewer than 2 sessions per week, which is not permitted, will actually lead to "detraining" and increased risk of injury.

Program Modifications: The program was designed in such a manner that all academies should be able to conduct the program with little or no modification. In particular, Calisthenics and Distance Running and the Aerobic Exercise Circuit with Calisthenics should seldom, if ever, require modification. The need to make changes to the Aerobic Exercise Circuit with Weights is more likely, due to differences in weight training equipment from academy to academy.

Changes to the **Minimum Program Requirements**, and to the specific exercises that make up a particular exercise session, are permissible provided that:

(1) Each substitute exercise addresses the same training objective as the exercise being replaced.

(2) No substitute exercise poses a known unacceptably high risk of injury.

(3) All changes are reported to POST.

(4) All changes to the **Minimum Program Requirements** are approved in advance by POST.

A form for reporting all changes to POST is provided in Appendix G (Notice of Physical Conditioning Program Modification, page 127). If any substitute exercise does not appear to meet the criteria enumerated in (1) and/or (2) above, POST will so notify the academy.

Student Participation: Also consistent with the "Frequency of Conditioning" principle, an effort should be made to assure that all students participate in the full program (i.e., 36 conditioning sessions). However, in recognition that injuries or other legitimate considerations may preclude all trainees from participating in all 36 conditioning sessions, as specified in the **Minimum Program Requirements**, a trainee may miss up to 6 of the required 36 sessions due to an injury or other legitimate reasons and still be recognized as having successfully completed the program.

Individual Accommodation: In the event a trainee has an injury or pre-exercise condition that prevents participation in a given exercise activity, the instructor should make every reasonable effort to make it possible for the trainee to participate in an alternate activity that will address the same training objective[5]. For example, a student with shin splints may be unable to run, but be able to meet the underlying cardiovascular conditioning objective by pedaling a stationary bicycle.

"Make-Up" sessions may be conducted and are encouraged for students who miss prescribed sessions due to injury or other legitimate reasons, provided that such "make-up" sessions are supervised and conducted in conformance with the **Minimum Program Requirements** (i.e., 36 exercise sessions within a 10-14 week time period).

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[5]In rare cases, injured students may fall under the protection of the Americans with Disabilities Act (ADA). A general discussion of how the ADA relates to law enforcement training is contained in the POST publication *The Americans with Disabilities Act: Questions and Answers*, which is available from POST upon request. Specific questions can be addressed to POST's Standards and Evaluation Services Bureau at (916) 227-2810.

TABLE 1

3 Day Per Week Program: Odd Weeks (Weeks 1, 3, 5, etc.)

	MONDAY	WEDNESDAY	FRIDAY
WARM-UP (8-10 min)	Slow Jog (3-5 min) Stretching (5 min)	Slow Jog (3-5 min) Stretching (5 min)	Slow Jog (3-5 min) Stretching (5 min)
CONDITIONING (25-45 min)	Calisthenics (10-15 min) 2-3 sets: crunches 20-50 reps dorsal arch 10-25 reps push-ups 10-25 reps Distance Run (15-40 min) 1.5 - 4.5 miles	Aerobic Exercise Circuit with weights (or Calisthenics) (40 min)	Calisthenics (10-15 min) 2-3 sets: crunches 20-50 reps dorsal arch 10-25 reps push-ups 20-25 reps Distance Run (15-40 min) 1.5 - 4.5 miles
COOL-DOWN (3-5 min)	Slow Jog/Walk (3-5 min)	Slow Jog/Walk (3-5 min)	Slow Jog/Walk (3-5 min)

TABLE 2

3 Day Per Week Program: Even Weeks (Weeks 2, 4, 6, etc.)

	MONDAY	WEDNESDAY	FRIDAY
WARM-UP (8-10 min)	Slow Jog (3-5 min) Stretching (5 min)	Slow Jog (3-5 min) Stretching (5 min)	Slow Jog (3-5 min) Stretching (5 min)
CONDITIONING (25-45 min)	Aerobic Exercise Circuit with weights (or Calisthenics) (40 min)	Calisthenics (10-15 min) 2-3 sets: crunches 20-50 reps dorsal arch 10-25 reps push-ups 10-25 reps Distance Run (15-40 min) 1.5 - 4.5 miles	Aerobic Exercise Circuit with weights (or Calisthenics) (40 min)
COOL-DOWN (3-5 min)	Slow Jog/Walk (3-5 min)	Slow Jog/Walk (3-5 min)	Slow Jog/Walk (3-5 min)

TABLE 3

5 Day Per Week Program: Odd Weeks (Weeks 1, 3, 5, etc.)

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
WARM-UP (8-10 min)	Slow Jog (3-5 min) Stretching (5 min)	Slow Jog (3-5 min) Stretching (5 min)	Slow Jog (3-5 min) Stretching (5 min)	Slow Jog (3-5 min) Stretching (5 min)	Slow Jog (3-5 min) Stretching (5 min)
CONDITIONING (25-45 min)	Calisthenics (10-15 min) 2-3 sets: crunches 20-50 reps dorsal arch 10-25 reps push-ups 10-25 reps Distance Run (15-40 min) 1.5 - 4.5 miles	Aerobic Exercise Circuit with weights (or Calisthenics) (40 min)	Calisthenics (10-15 min) 2-3 sets: crunches 20-50 reps dorsal arch 10-25 reps push-ups 10-25 reps Distance Run (15-40 min) 1.5 - 4.5 miles	Aerobic Exercise Circuit with weights (or Calisthenics) (40 min)	Calisthenics (10-15 min) 2-3 sets: crunches 20-50 reps dorsal arch 10-25 reps push-ups 10-25 reps Distance Run (15-40 min) 1.5 - 4.5 miles
COOL-DOWN (3-5 min)	Slow Jog/Walk (3-5 min)	Slow Jog/Walk (3-5 min)	Slow Jog/Walk (3-5 min)	Slow Jog/Walk (3-5 min)	Slow Jog/Walk (3-5 min)

TABLE 4

5 Day Per Week Program: Even Weeks (Weeks 2, 4, 6, etc.)

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
WARM-UP (8-10 min)	Slow Jog (3-5 min) Stretching (5 min)	Slow Jog (3-5 min) Stretching (5 min)	Slow Jog (3-5 min) Stretching (5 min)	Slow Jog (3-5 min) Stretching (5 min)	Slow Jog (3-5 min) Stretching (5 min)
CONDITIONING (25-45 min)	Aerobic Exercise Circuit with weights (or Calisthenics) (40 min)	Calisthenics (10-15 min) 2-3 sets: crunches 20-50 reps dorsal arch 10-25 reps push-ups 10-25 reps Distance Run (15-40 min) 1.5 - 4.5 miles	Aerobic Exercise Circuit with weights (or Calisthenics) (40 min)	Calisthenics (10-15 min) 2-3 sets: crunches 20-50 reps dorsal arch 10-25 reps push-ups 10-25 reps Distance Run (15-40 min) 1.5 - 4.5 miles	Aerobic Exercise Circuit with weights (or Calisthenics) (40 min)
COOL-DOWN (3-5 min)	Slow Jog/Walk (3-5 min)	Slow Jog/Walk (3-5 min)	Slow Jog/Walk (3-5 min)	Slow Jog/Walk (3-5 min)	Slow Jog/Walk (3-5 min)

E. Conditioning Activities

1. Warm-Up/Cool-Down and Stretches

Table 5 (page 32) describes the warm-up/cool-down and stretches. Refer to Figure 3 (page 33) for an illustration of the anatomical structure of the body. Figure 4 (page 34) illustrates the actual stretches and muscles involved.

The beginning of each exercise session should begin with a walk or slow jog. The intent of the walk/slow jog activity is to gradually increase the heart rate and blood flow so that the muscles will be warmed up for the stretching phase. This initial warm-up should take from three to five minutes, depending on the temperature. In general, more time should be spent warming-up the muscles and the cardiovascular system in cooler weather. Sixty degrees Fahrenheit is an appropriate temperature to use as a guide; if the temperature falls below 60°, increase the duration of the walk/jog.

Normally, the walk/jog phase can be effectively accomplished by having students walk/jog to the exercise site and continue walking/jogging until the instructor calls the class to order for the stretching phase.

The stretching phase of the warm-up should take five minutes. The purpose of stretching exercises is to enhance the range of motion of the principal joints of the body and the associated musculature.

In general, stretching exercises are of two basic types: static and dynamic. Only static exercises are used in this program. Static exercises require that a position be assumed and held for a specified number of seconds. The proper technique is to slowly stretch until the point of resistance is encountered, and then hold this position for the specified number of seconds. Stretching exercises should never involve ballistic movement (bouncing) nor should they be painful. The proper action for each stretching exercise is illustrated in Figure 4. The exercises shown in Table 5 need not be performed in the order shown. However, it is recommended that all 'seated' stretches be performed together, prior to the 'standing' stretches.

There are two important considerations during the cool-down phase. First, as indicated previously, is the continuation of activity at a decreased intensity. The idea is to gradually bring the heart rate down to around 100 to 110 beats per minute. Students should jog-walk from 3 to 5 minutes following vigorous exercise. Abruptly stopping exercise when one has been vigorously working out may trap all the blood in the muscles which have suddenly stopped moving, and this can result in problems since the heart may not be able to get sufficient blood and oxygen. Following the gradual lowering of the heart rate, it is a good idea to stretch for a few minutes. Stretching is most effective when the student is warmed-up. Stretching after vigorous exercise helps to prevent muscle soreness and improves flexibility.

2. Distance Running

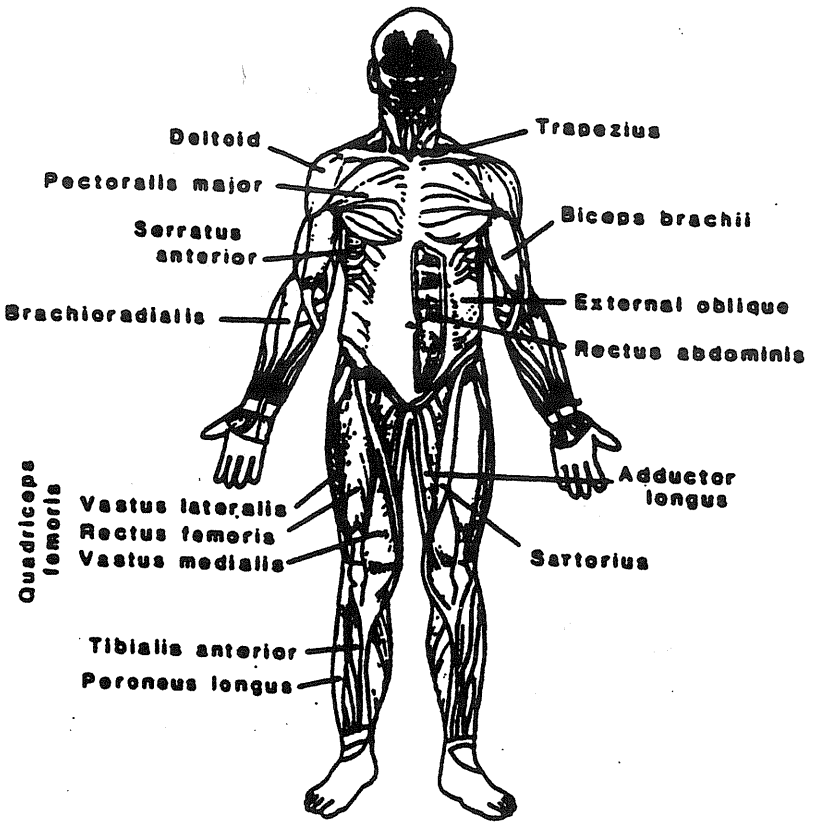
Table 6 describes the distance running program. Target pace times are given, which progress as the program continues and students become more fit. Although pace times are given, it is important to remember that the more critical determinant is the training heart rate of the student during exercise (see Chapter 2).

In the training schedule, a set of three calisthenic exercises precedes each run. The purpose of these exercises is to address muscular strength and muscular endurance in addition to cardiovascular training. The calisthenics exercises included in the program are abdominal crunches, dorsal arches and push-ups (see Tables 1, 2, 3 and 4).

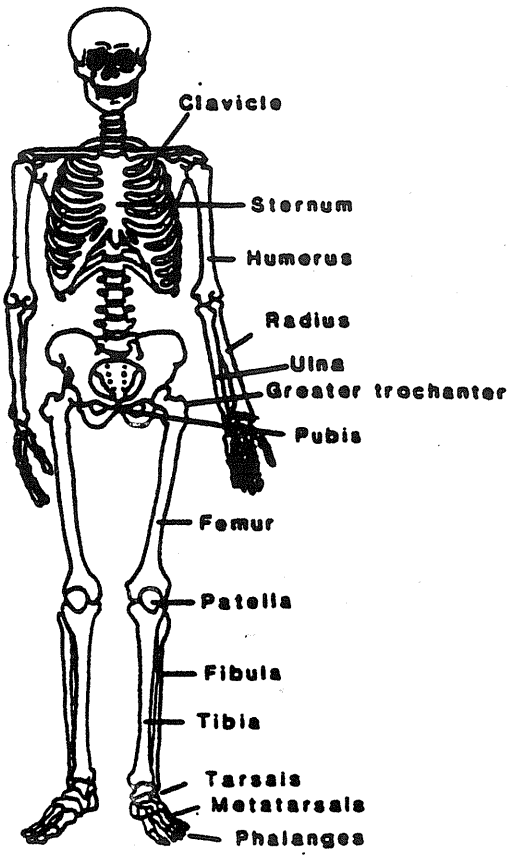
Table 5. **Warm-up/Cool-Down and Stretches**

ACTIVITY	TARGETED AREAS (see Anatomical Charts)
1. Jog to exercise site	warms up body for exercise
2. Seated toe touch	low back, gluteal, hamstring
3. Seated groin stretch	adductors
4. Lying gluteal stretch	gluteals
5. Lying knee to chest (alternate legs)	low back, gluteals
6. Seated leg over hip and back stretch	back, gluteals
7. Standing quadriceps stretch	quadriceps
8. Standing gastrocnemius (with alternate soleus stretch)	gastrocnemius, soleus
9. Static trunk rotation	trunk rotators, obliques
10. Alternate shoulder stretch	deltoid, tricep
11. Neck stretches	neck musculature
12. Over head side bends	illo-tibial band

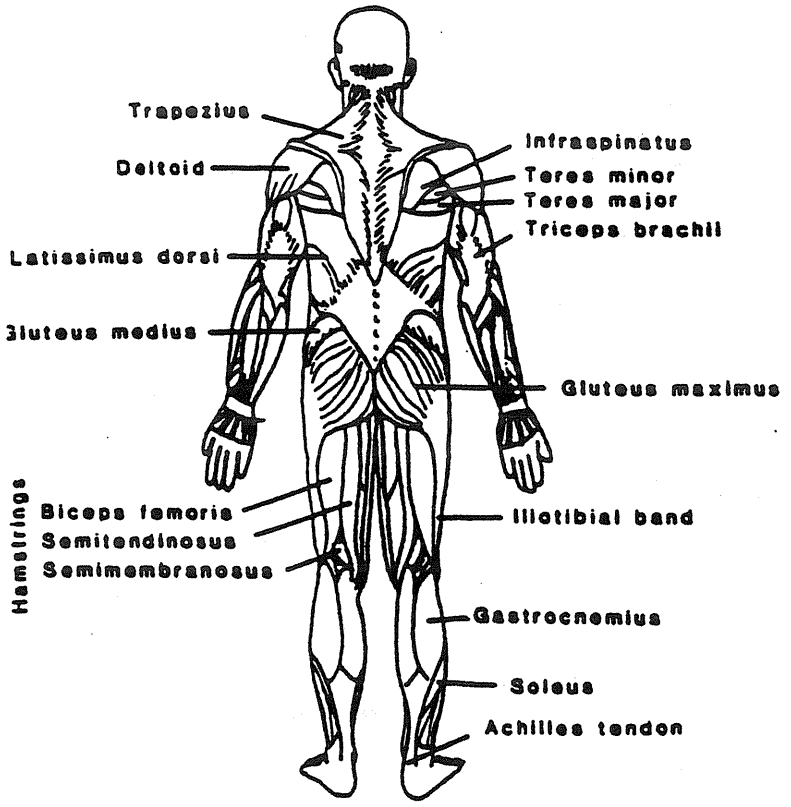
Figure 3. Anatomical Charts



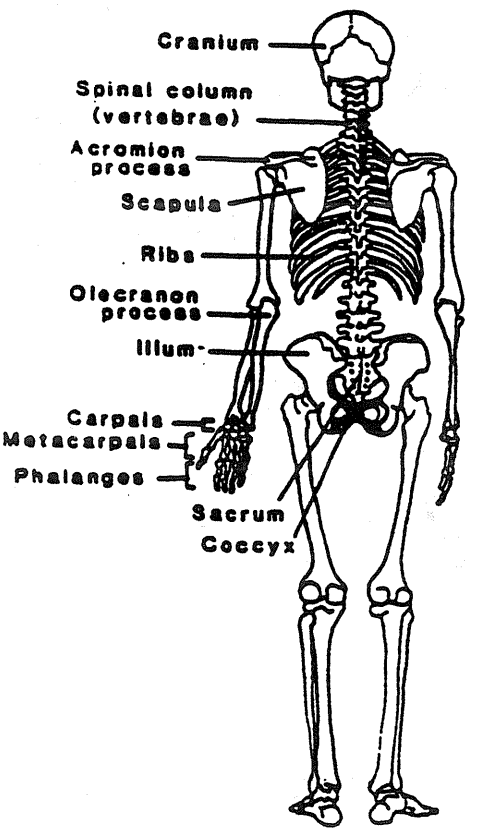
Muscles of the human body: front view.



Front view of the human skeleton.

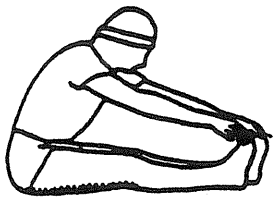


Muscles of the human body: back view.



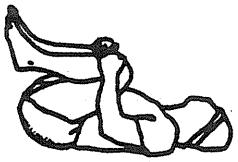
Back view of the human skeleton.

Figure 4. Stretching Illustrations *

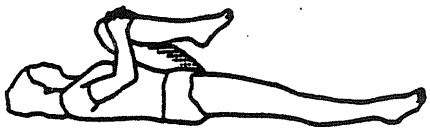


2. Seated Toe Touch

3. Seated Groin Stretch



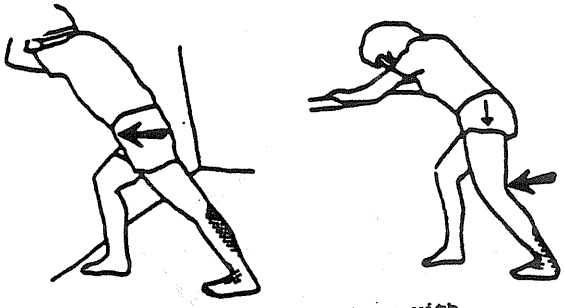
4. Lying Gluteal Stretch



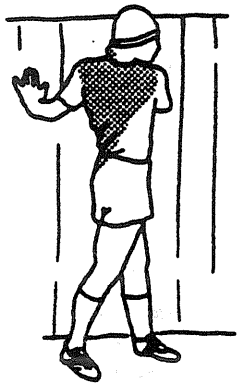
5. Lying knee to chest (alternate legs)

6. Seated leg over hip and back stretch

7. Standing Quad Stretch

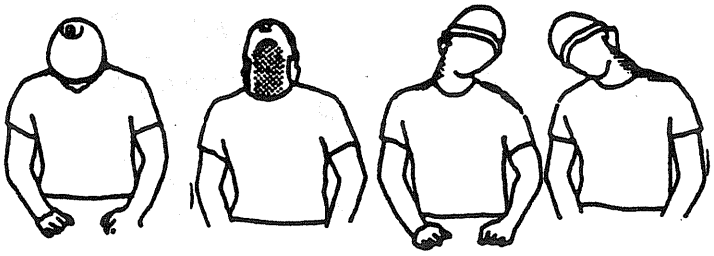


8. Standing Gastroc with alternate soleus stretch

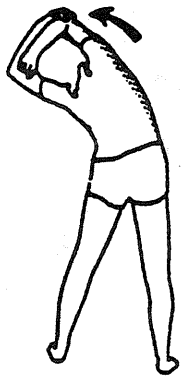


9. Static Trunk Rotation

10. Alternate Shoulder Stretch



11. Four-way Neck Stretch (Slow, non-rotational)



12. Over Head Side Bands

*Reproduced from Anderson, Bob, Stretching, Shelter Publications, Bolinas, CA, 1980.

Correct Mechanics of Distance Running

1. Perform a thorough warm-up with static stretching of legs and hips.

2. Correct posture is one in which the trunk is almost straight above the hips; do not lean forward because it will stress the low back when running for distance.

3. Carry arms at right angle at elbows, hands loosely cupped -- not clenched in fist or open -- swing hands diagonally forward to the midline of trunk (belly button) and back to a point adjacent to the hips. This is the natural line of the arm on the shoulder, not straight forward and backward. Also carry arm action low around the shoulders; do not raise the elbows and shoulders during this action because it interferes with the muscles of the trunk required for breathing.

4. Run so that the foot contacts the ground heel first or almost flat-footed -- not on the ball of the foot with heel raised. After the heel contacts, the foot should either roll up onto the ball of the foot or forward to an almost flat-footed contact. This foot placement relaxes the calf muscles necessary for distance running. In addition, when the foot breaks contact with the ground, concentrate on relaxing the trailing leg to minimize the energy required. The ankle and calf muscle of the trailing leg should be relaxed and the action of the forward leg should be without a high knee lift during endurance running. When the body rotates forward, the rear foot is pulled off the ground and does not thrust off the ground as during striding or sprinting.

5. The proper breathing technique is critical to distance running. It should be rhythmic and deep, and it should be in "sync" with the running tempo. It should begin with a full inhalation for two running steps and expiration for two running steps. Later, students may need to shift to an inhalation and expiration for every two steps. However, students should never allow themselves to pant with shallow breaths or in an unrhythmic manner. The latter is counterproductive to sustaining the necessary air exchange required of the exercise. The inability to sustain controlled, rhythmic breathing is a symptom of overexertion.

3. Aerobic Exercise Circuits

The conditioning program seeks to maximize the time allotted for physical conditioning by combining the Muscular Strength/Endurance and Cardiovascular Endurance objectives into single exercise activities. The way these objectives are accomplished in the conditioning program is referred to as "circuit training." The circuit training principle requires that an individual complete a specified number of exercises in a sequential manner, at a specified pace or tempo, and at a high intensity. In general, circuit training promotes all-around development (fitness). There are two Aerobic Exercise Circuits in the program.

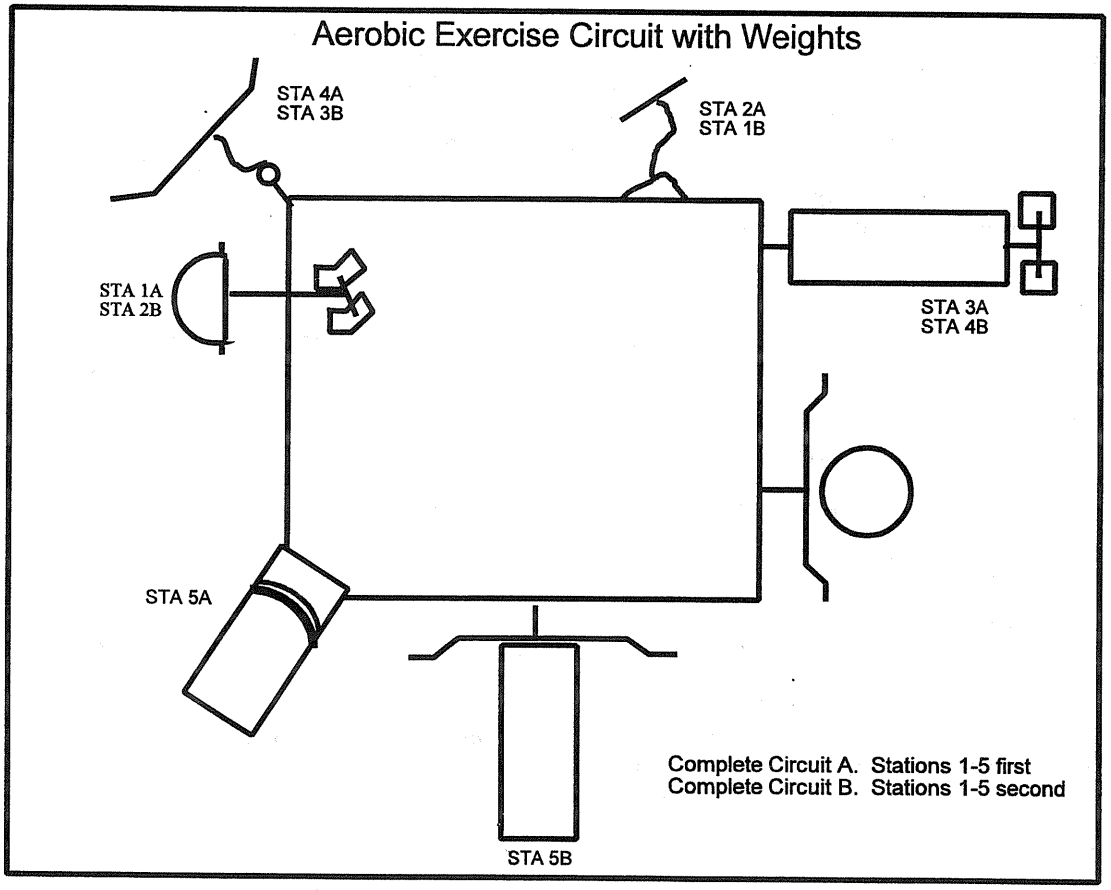
Aerobic Exercise Circuit with Weights

Table 7 describes the Aerobic Exercise Circuit with Weights. This activity has two conditioning objectives: Muscular Strength/Endurance and Cardiovascular Endurance. Note that there are two circuits (A and B) and that each circuit is run twice. It is suggested that students form groups of three, so that one student performs the weight training exercise while the other two jog in place. It is important to remember that all students should be exercising except when moving between stations -- this is meant to be aerobic. If too long a rest is taken, the heart rate will fall below the training level and the aerobic component will be compromised. Illustration 1 shows the layout of the stations on a Universal System.

Table 6. Distance Running

Activity (Elapsed time is 15-40 minutes)	Week 1 - 2	Week 3 - 4	Week 5 - 6	Week 7 - 8	Week 9 - 10	Week 11- 12	Week 13 +
Distance (in Miles)	1.5-2.0	2.0-2.5	2.5-3.0	3.0-3.5	3.5-4.0	4.0-4.5	4.5
Pace (minutes/mile)	10:00	9:30	9:00	8:30	8:00	8:00	8:00
Pace (seconds/440 Yds)	150	143	135	128	120	120	120
Use Exercise Heart Rate as Reference to Adjust the Above Program							

Illustration 1



Aerobic Exercise Circuit with Calisthenics

Table 8 describes the Aerobic Exercise Circuit with calisthenics. The objectives of this circuit are also Muscular Strength/Endurance and Cardiovascular Endurance. The activity requires that the entire circuit be completed TWICE.

The circuit calls for repeated transitions from seven different calisthenics to sprinting and jogging. The calisthenics specified in Table 8 are illustrated in Figure 5. Each calisthenic was selected for its training specificity--i.e., specific anatomical muscle group focus. Inspection of Table 8 shows that the circuit is comprised of repeated cycles of completing a calisthenic, sprinting 220 yards, completing a second calisthenic and then jogging 440 or 880 yards. The sprinting distance in the circuit is fixed at 220 yards. The jogging distance includes 440 and 880 yard distances. It is important to note that the 440 and 880 yard jogs are meant to be heart rate recovery periods.

The prescribed number of repetitions per set (i.e., targets) for the calisthenics are designed to increase the muscular/strength endurance of specific muscle groups. These performance targets appear in the columns of the table. If an individual is unable to perform the prescribed repetitions without interruption, then he/she may attempt to achieve the prescribed number in two or more subsets.

In reviewing Tables 7 and 8 please note that both circuits have been constructed so that the muscle focus of the exercises alternates between the upper and lower body. Any changes made to either circuit should maintain this upper/lower body alternation. Additionally, if any exercises are substituted for those specified in the tables, they should address the same muscle groups as those substituted for and should be "safe" exercises. (See requirements for making program modifications on page 27).

4. Physical Conditioning Weekly Training/Planning Record

Presented in Table 9 is a form entitled "Physical Conditioning Weekly Training/Planning Record". The form is provided as a tool to assist the local instructor in planning, scheduling and documenting all physical conditioning activities. The form should be copied and used to keep track of the activities performed. Instructions for completing the form are provided on the back.

F. Prescreening Recommendations

As will be discussed in Chapter Six, it is strongly recommended that all students be medically prescreened before being permitted to participate in either the initial testing or the physical conditioning program. In addition to medical prescreening, it is recommended that immediately prior to initial testing or initial vigorous exercise each student's resting heart rate and resting blood pressure be taken. A protocol for obtaining resting heart rate and blood pressure measurements is provided in Appendix A (page 78). Each student also should be questioned at this time regarding any developments subsequent to initial medical prescreening that may have an impact on their ability to be tested or to exercise.

Table 7. Aerobic Exercise Circuit With Weights

Run each circuit twice.

CIRCUIT "A"

Station	Student #1	Students #2 & #3	Anatomical Focus (see Anatomical Chart)	(see illustration 1)
1-A	Leg Press	Jogging in Place	Quadriceps Gluteals Hamstrings	Organize students into groups of 3. Student #1 does indicated exercise while Students #2 and #3 jog in place Time at each station: 30 sec/student x 3 students +30 sec travel to next station 120 sec total time/station
2-A	Bicep Curl	Jogging in Place	Biceps	
3-A	Quad. Extension	Jogging in Place	Quadriceps	
4-A	Lat Pull Down	Jogging in Place	Latissimus Dorsi	
5-A	Reverse Ab Crunch	Jogging in Place	Rectus Abdominus	

CIRCUIT "B"

Station	Student #1	Students #2 & #3	Anatomical Focus (see Anatomical Chart)	(see illustration 1)
1-B	Upright Rowing	Jogging in Place	Trapezius Deltoid	Follow same procedure as above for CIRCUIT "A"
2-B	Calf Press	Jogging in Place	Gastrocnemius Soleus	
3-B	Tricep Push Down	Jogging in Place	Tricep	
4-B	Hamstring Curls	Jogging in Place	Hamstrings Gluteals	
5-B	Bench Press	Jogging in Place	Pectorals Triceps	

Procedure: Organize students into groups of three. Student #1 does the indicated weight training exercise while Students #2 and #3 jog in place.

On the first single whistle blast, Student #1 does the indicated weight training exercise while Students #2 and #3 jog in place. On the second single whistle blast, Student #2 begins the weight training exercise while Students #1 and #3 jog in place. On the third single whistle blast, Student #3 begins the weight training exercise while Students #1 and #2 jog in place.

On the double whistle blast (at 120 seconds), all three students proceed to the next station.

Resistance should be set so that the student reaches temporary muscle failure (TMF*) within 8-10 repetitions of the exercise. If temporary muscle failure occurs before the student reaches the 8th repetition, the weight is too heavy and should be decreased. Conversely, if the student reaches the 10th repetition without muscle failure, the weight load is too light and should be increased.

*TMF is defined as the point at which the student's level of muscular fatigue will not permit an additional repetition of the exercise when using proper technique.

Table 8. **Aerobic Exercise Circuit with Calisthenics**

Run circuit twice.

ACTIVITY	WEEK 1 - 2	WEEK 3 - 4	WEEK 5 - 6	WEEK 7 - 8	WEEK 9 - 10	WEEK 11 - 12	WEEK 13 +
1. Power push ups	10	10	12	12	14	14	add 2 reps every 2 weeks
2. Sprint 220 yds at 3/4 speed	220	220	220	220	220	220	220
3. Abdominal crunches (reps) (pause at top, feet off deck)	20 2 sec pause	25 2 sec pause	30 3 sec pause	35 3 sec pause	40 4 sec pause	45 4 sec pause	add 5 reps every 2 weeks 4 sec pause
4. Jog (yards)	440	440	440	440	440	440	440
5. Alternate dorsal arches	10	12	14	16	18	20	add 2 reps every 2 weeks
6. Sprint 220 yds at 3/4 speed	220	220	220	220	220	220	220
7. Push-ups (military)	15	20	25	30	35	40	add 5 reps every 2 weeks
8. Jog (yards)	440	440	440	440	440	440	440
9. Bicycle from crunch position (4 count)	20	20	25	25	30	30	add 5 reps every 2 weeks
10. Sprint 220 yds at 3/4 speed	220	220	220	220	220	220	220
11. Prayer push-ups	6	6	8	8	10	10	add 2 reps every 2 weeks
12. Jog (yards)	880	880	880	880	880	880	880

G. Guidelines Training High and Low Fit Students

The initial fitness levels of students will vary greatly upon entrance to the academy. When conducting a class a balance must be struck between group exercise (at the same intensity and pace for all students) and individual capacities. Forcing the least fit student to run with the most fit student is likely to be detrimental to both individuals. Certain activities lend themselves to simultaneous group participation with regard to intensity and pace, e.g., stretching and calisthenics. Aerobic activities like running, however, are better accomplished at the individual level -- such as by monitoring heart rate.

The target performance levels called for in each conditioning activity represent appropriate overload criteria for the average young adult trainee. These target levels, however, may be inappropriate for individuals who either cannot meet the initial performance targets, or who have current physical abilities that significantly exceed the target levels. The program has been designed to accommodate either type of trainee.

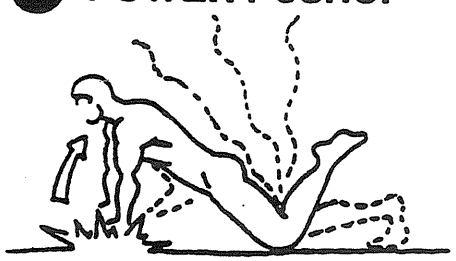
In order to provide an appropriate training stimulus (i.e., overload) for individuals who are above or below the initial target levels, it is recommended that students be assigned to exercise groups based upon their initial conditioning level. Each group can then begin the program on an intensity (or overload) schedule from which they will derive maximal benefits, i.e., improvement.

H. Initial and Interim Assessment Procedures

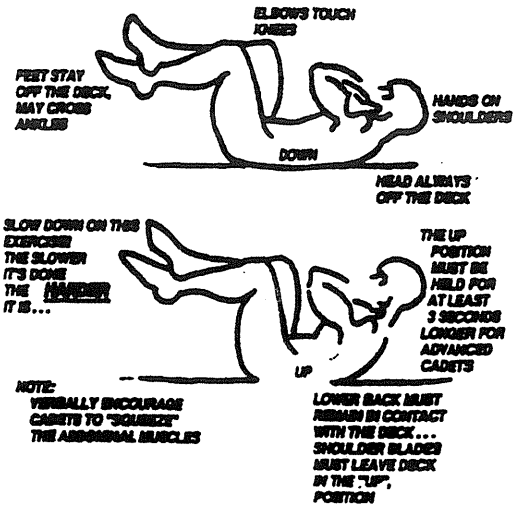
As indicated on page 3, one of the most important influences on the student's attitude toward exercise is the opportunity to see progress as a result of the hard work required in the program. Initial and interim assessments provide valuable feedback to the student, showing areas of strength and weakness. POST recommends that a simple test battery be administered at the beginning and about halfway through the program. Refer to Appendix A for the test protocols and scoring forms. If possible, test results should be explained to each student with opportunity for discussion. Any time that can be devoted to personally reviewing and discussing test scores and fitness status with the students is time well spent.

AEROBIC EXERCISE CIRCUIT CALISTHENICS

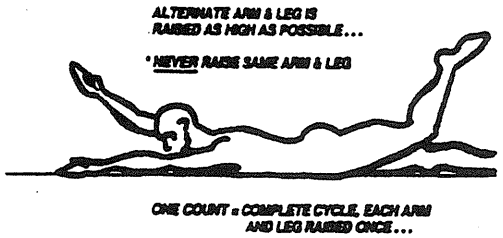
1 POWER PUSHUP



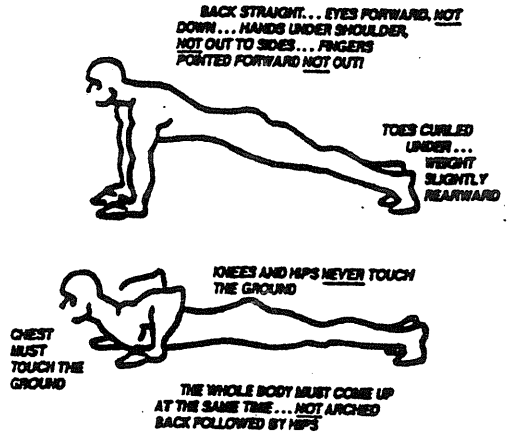
3 ABDOMINAL CRUNCH



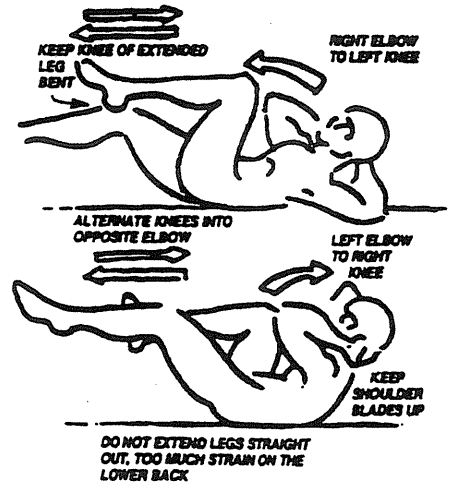
5 MODIFIED DORSAL ARCH



7 PUSHUPS



9 ABDOMINAL CRUNCH
WITH A "BICYCLE"



11 PUSHUPS
"PRAYER" TYPE

Table 9.

PHYSICAL CONDITIONING WEEKLY TRAINING/PLANNING RECORD

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
No Physical Conditioning Scheduled	☐	☐	☐	☐	☐
Work Sample Test Battery Administration	☐	☐	☐	☐	☐
Warm-Up/Stretching	☐	☐	☐	☐	☐
Conditioning					
Calisthenic Distance run	☐	☐	☐	☐	☐
Aerobic Exercise Circuit with Weights	☐	☐	☐	☐	☐
Aerobic Exercise Circuit with Calisthenics	☐	☐	☐	☐	☐
Cool-Down	☐	☐	☐	☐	☐

COMMENTS:

Date: _____ Week of Training _____ _____

Instructor's Signature

WEEKLY TRAINING AND PLANNING RECORD

The Purposes of the Weekly Training and Planning

1) Plan the PT week.

2) Serve as a permanent training record.

It is strongly recommended that the form be filled out weekly and kept on file for 3 years. This will provide a record of the academy physical conditioning activity.

How to Use the Weekly Training and Planning Record

- Remove from the Manual and reproduce form.
- Enter the date of the first day of the training week and the number of the training week (1st, 2nd, etc.) on the bottom of the form.
- Mark appropriate box if no PT is conducted or the Work Sample Test is administered.
- On days when PT is conducted, you must have marked the Warm-Up box, a Conditioning box, and the Cool-Down box.
- Comments section should be used to document changes in schedule, inclement weather, unusual occurrences, etc.
- The instructor who completed the form should sign the form at the conclusion of the training week.

I. Administration of the POST Job-Related Work Sample Test Battery

The POST Job-Related Work Sample Test Battery, which as stated earlier must be successfully completed at the conclusion of the training program, should also be administered during the fourth to sixth week of the training program. The purpose of administering the test at this time is to provide academy staff with information regarding each student's ability to perform the events in the test.

Caution should be exercised during the interim administration of the Work Sample Test Battery, since, for many students, this may be their first experience with these tests. For safety reasons, it is recommended that a minimum of four (4) weeks of training be completed and that staff provide instruction to students on effective wall/fence climbing techniques before conducting the test for the first time. A handout covering safe wall/fence climbing techniques is provided in Appendix H (page 131).

Also, as indicated on page 26, staff should allow students to practice psychomotor skills (such as wall/fence climbing) at a reduced speed whenever feasible prior to asking them for a full-effort performance.

CHAPTER FOUR

CLASSROOM INSTRUCTION

In addition to the conditioning program/testing requirements enumerated in this manual, POST publication *Training Specifications for the Regular Basic Course 1995* specifies that physical fitness instruction in the POST Basic Course must include the following instructional goals, topics, and learning activities:

INSTRUCTIONAL GOALS

The goals of instruction on **Lifetime Fitness** are to provide students with:

A. an understanding of the physical and behavioral ailments for which law enforcement officers may be at high risk;

B. knowledge of the techniques for reducing the risk of developing debilitating physical ailments common to peace officers;

C. ability to recognize the signs and symptoms of stress and apply stress reduction techniques;

D. knowledge of techniques for managing body composition including nutrition and exercise;

E. knowledge of physical conditioning principles;

F. an appreciation for a healthy lifestyle and commitment to a lifetime fitness program; and

G. the ability to perform the mentally and physically demanding tasks required of a law enforcement officer.

REQUIRED TOPICS

The following topics shall be covered:

A. Recognizing the signs and symptoms of stress (e.g. high blood pressure, headaches, sleep/eating disorders, etc.)

B. Physical disablers and illnesses common to law enforcement officers to include:

1. cardiovascular disease (including risk factors)

2. low back injury

3. other emerging disablers (e.g. digestive disorders, cancer, etc.)

C. The short-term and long-term effects of substance use/abuse to include:

1. alcohol

2. tobacco

3. other substances capable of being abused (e.g. prescription and nonprescription drugs, caffeine, illegal drugs, etc.)

D. Elements of a disease risk management program to include:

1. regular exercise
2. body composition management
3. proper nutrition
4. no substance abuse
5. management of stress

E. Principles of body composition management to include:

1. body fat
2. nutrition
3. physical activity

F. Principles of physical conditioning to include:

1. progressive overload
2. specificity
3. frequency
4. duration/time
5. intensity

G. Techniques for stress management (e.g. exercise, professional counseling, relaxation)

H. Methods of self-evaluating personal fitness levels in the following areas:

1. cardiovascular fitness
2. flexibility
3. muscular strength
4. muscular endurance
5. body composition

I. Elements of a personal fitness program to include:

1. cardiovascular
2. muscular strength
3. flexibility
4. muscular endurance

J. Basic principles of nutrition to include:

1. food constituents (e.g. proteins, carbohydrates and fats)

2. elements of a balanced diet (e.g. determining the proportion of calories that come from fat)

3. the effects of various foods on physical performance, body composition and general health

K. Components of an exercise session to include:

1. warm-up/stretching

2. conditioning phase

3. cool-down/stretching

4. evaluation and treatment of training injuries

REQUIRED LEARNING ACTIVITIES

A. Participation in a structured POST-approved physical conditioning program (described on pages 25-44)

B. Participation in a facilitated discussion, workbook assignment, computer-assisted training session or equivalent instructional activity regarding health problems common to law enforcement officers and related risk reduction management techniques

C. Participation in a facilitated discussion, workbook assignment, computer-assisted training session or equivalent instructional activity regarding proper nutrition

D. Participation in a facilitated discussion, workbook assignment, computer-assisted training session or equivalent instructional activity regarding techniques used to evaluate physical fitness

E. Participation in a facilitated discussion, workbook assignment, computer-assisted training session or equivalent instructional activity regarding the principles of physical conditioning

Detailed curriculum for each of the required topics as well as a variety of supporting materials covering nutrition, weight control and body composition management is provided in *POST Basic Course Workbook Series, Learning Domain 32.*

CHAPTER FIVE

THE POST JOB-RELATED WORK SAMPLE TEST BATTERY

The POST Job-Related Work Sample Test Battery should be administered during the fourth to sixth week of training and must be administered at the conclusion of the physical conditioning program.

As indicated, each student must successfully complete this test battery (or another POST approved job-related test) at the conclusion of the conditioning program. This chapter contains a brief description of how the POST test battery was developed, as well as written procedures for administering and scoring the test. Also included are POST's Guidelines for Evaluating Alternative Physical Ability Tests.

A. Development of the POST Job-Related Test Battery

The first step in developing the battery consisted of conducting a detailed job analysis to identify the nature and extent of significant physical tasks performed on patrol. A combination work diary-interview-survey approach was used to collect the job analysis information. Data was collected from a representative sample of officers in each of 120 police and sheriffs' departments.

The job task information was used to develop tests which simulate actual job tasks (climbing obstacles, moving incapacitated persons, etc.). Each test was designed to simulate a distinct and significant job task which officers reported performing on patrol. Such tests, i.e., work sample tests, are job-related to the extent that they reliably sample behaviors which must be performed on the job (established by the job analysis). A total of five work sample tests were developed for inclusion into the battery:

99 YARD OBSTACLE COURSE	Run a 99 yard obstacle course consisting of several sharp turns, a number of curb-height obstacles, and a 34 inch high obstacle that must be vaulted
BODY DRAG	Lift and drag 165 pound lifelike dummy 32 feet
CHAIN LINK FENCE	Run 5 yards to a 6 foot chain link fence, climb over fence, continue running another 25 yards
SOLID FENCE CLIMB	Run 5 yards to a 6 foot solid fence, climb over fence, continue running another 25 yards
500 YARD RUN	Run 500 yards (equivalent to 1 lap plus 60 yards of a standard running track)

The second step in developing the test battery consisted of determining the reliability of the tests. To this end, the battery was administered to a group of 445 students at both the beginning and the end of their academy physical training program. Analyses of the test data revealed that the test battery is highly reliable.

The final step in the test development process consisted of verifying the job-relatedness of the five work samples and establishing a minimum passing score. This was accomplished by administering the test battery to a representative sample of 148 patrol officers, and then asking them to rate the similarity of the test events to critical patrol tasks and to propose a reasonable passing standard (time) for each event. The officers felt that the test items were very similar to actual patrol tasks, and that the ability to perform each test event was critically important to patrol officer performance. The performance standard established for the battery was based directly on the time estimates that the officers felt were reasonable and consistent with normal expectations of acceptable proficiency.

B. Administration of the POST Work Sample Test Battery

General Recommendations

For purposes of assuring standardization across the state, all test equipment must meet stated specifications and all test protocols must be strictly followed.

As a means of ensuring that all tests are administered in a consistent and proper manner, POST recommends that all proctors have some background in exercise and exercise testing. Such persons need not have an extensive or formal educational background, but should have a working familiarity with the types of tests that are included in the test battery.

POST further recommends that a training session be held for those persons selected to be test proctors. An approach which has been found to be particularly effective for this training consists of having the proctors, as a group, go through the following step-by-step process for each test in the test battery.

1. Review and discuss test proctor instructions.

2. Set up all testing equipment as specified in instructions.

3. Review setup for correctness; note critical features of setup and/or errors made in setup.

4. Administer tests to each other; proctors take turns being test subjects; where appropriate proctors compare test results obtained for given test subject (e.g., stopwatch readings).

5. Critique and discuss results of trial administrations; note critical features of test administration; resolve all discrepancies identified during trial administrations.

6. Continue steps 4 and 5 as necessary.

At the conclusion of this process, each proctor assumes his/her designated test station, and several volunteers proceed from station-to-station through the entire test battery. This allows the proctors to field test and identify any revisions that need to be made in the sequencing of the tests.

C. Protocols for Test Administration

Each test is administered at a separate test station. All tests are timed. With the exception of the 500-Yard Run, each test is administered twice, and the time for the fastest trial is used as the student's score. The specific instructions for administering each test follow. A flow chart which depicts the processing of candidates and a form for recording each candidate's test data are also provided.

Example Test Flow Chart for Work Sample Test Battery

Proctors Required[1]	Test Station	Elapsed Time (in minutes)[2]
3	A: Warm-up exercises	15[3]
1	B: Agility Run (two trials)	15
1	C: Body Drag (two trials)	15
1	D: Obstacle Climbs	
	Chain Link Fence (two trials) Solid Fence (two trials)	20
3	E: 500-Yard Run	15[4]
Total Proctors:	3	
Student testing rate:	40/1.5 hours (students tested in groups of 15 or less; each group begins at different station (B to D) and changes among stations B, C, D every 15-20 minutes)	
	All students are at stations A and E at the same time	

[1] One proctor assigned to test stations B, C, and D. All proctors are present for Station A and Station E.

[2] Estimates assume all test stations will be located in close proximity to each other.

[3] All students should group together at Station A for warm-up.

[4] All students report at same time and are run in groups. Group size will depend on number of available stopwatches.

Station A - Initial Processing/Warm-up

Materials:

Students' scoring forms, pencils, area large enough to conduct the warm-up routine (appearing in Table 5 in Chapter 3).

Procedures:

1. Give each student a Work Sample Test Battery data collection form. Instruct students to fill in their name, the date, and any other information that the academy wishes to collect (e.g., I.D. number, hiring agency).

2. Form three or more groups of equal size. Inform students that they are to remain with their group throughout the test. Academies with very large classes may need to form more than three groups.

3. Move student class to warm-up area (if not already there) and conduct warm-up activity (Table 5).

4. Following warm-up, send each group to each test station using the following schedule. Large classes may require a different schedule.

Group	1st Station	2nd Station	3rd Station	Last Station
Group 1	Station B,	Station C,	Station D,	Station E
Group 2	Station C,	Station D,	Station B,	Station E
Group 3	Station D,	Station B,	Station C,	Station E

Station B - 99 Yard Obstacle Course

Materials:

Stopwatch, measuring tape, traffic cones (18), cord (250'), 6"x6"x3' curbs (3), 34" high obstacle (see test materials description, page 67).

Setup:

1. Position obstacles and traffic cones (as specified in Figure 4) on a smooth, flat, dry, paved, short grass, or hard-packed surface. Recheck all measurements to verify all obstacles are correctly positioned. String cord between traffic cones.

Procedures:

1. INSTRUCTIONS TO STUDENT: "This test simulates a short-distance foot pursuit such as might occur in the parking lot of an office complex. The test requires you to make frequent changes in direction while running as fast as possible. The test will be administered twice, with a two-minute rest period between administrations."

2. Walk length of course with student. Point out boundaries and emphasize that 34" obstacle must be vaulted by placing both hands on top of the barrier.

3. Allow student several minutes to stretch and warm-up.

4. Position student at start line.

5. Remind student that:

   a. he/she is to run the course as quickly as possible;

   b. he/she will be tested twice, with at least a two-minute rest period between tests.

6. Assume position approximately halfway between start/finish lines as shown in the diagram. Set stopwatch at zero and start test with command, "ready, go."

7. Clock and record time taken to complete course on student's test form. Record time to the nearest tenth of a second.

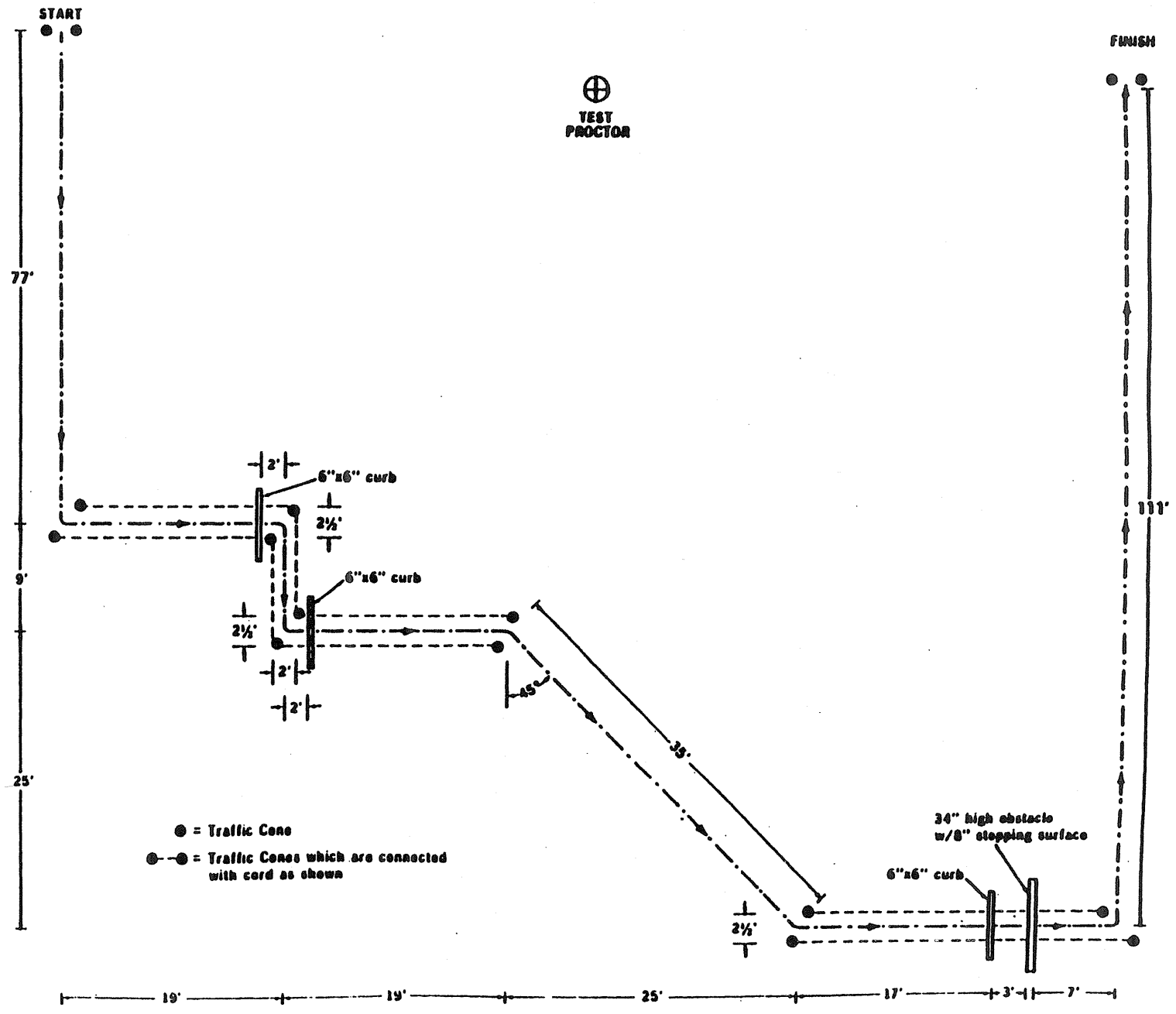
8. Allow student two minutes to rest.

9. Retest student following same procedures.

10. Direct student to next test station.

Figure 5.

99 YARD OBSTACLE COURSE



Station C - Body Drag

Materials:

Stopwatch, 165-pound dummy, measuring tape and 4 traffic cones, tape to mark start/finish lines.

Setup:

1. Test is to be administered on a smooth, flat, dry, paved, short grass, or hard-packed surface. Measure and mark start/finish lines 32 feet apart. Allow 10-15 feet beyond each line for the candidate to stop at the conclusion of the test. Mark lines with tape or chalk and traffic cones.

2. Position dummy face side up with head toward finish line and feet 12 inches behind start line (see diagram).

Procedure:

1. INSTRUCTIONS TO STUDENT: "This test simulates dragging someone who is physically incapacitated. The test requires that you lift and drag a lifelike dummy that is lying face up on the floor. The dummy must be dragged 32 feet. The test will be given twice, with a two-minute rest period in between. When lifting and dragging the dummy, please do not grab or pull the dummy by the head or arms as this may damage the dummy. You will lift the dummy first and tell me when you are ready to begin the test. Time starts when the dummy's feet cross the starting line and ends when the feet cross the finish line. DO NOT JERK THE DUMMY UP WHEN LIFTING IT."

2. Demonstrate proper method of grasping, lifting dummy (grabbing dummy under arms and lifting dummy's upper body off ground and up against student's body while in knee bent, back relatively straight position--see diagram).

3. Instruct student to warm-up by jogging in place and stretching out the lower back and trunk.

4. Remind student that he/she is to drag the dummy as fast as possible because the test is timed.

5. Check position of dummy. Set stopwatch at zero. Position self adjacent to student.

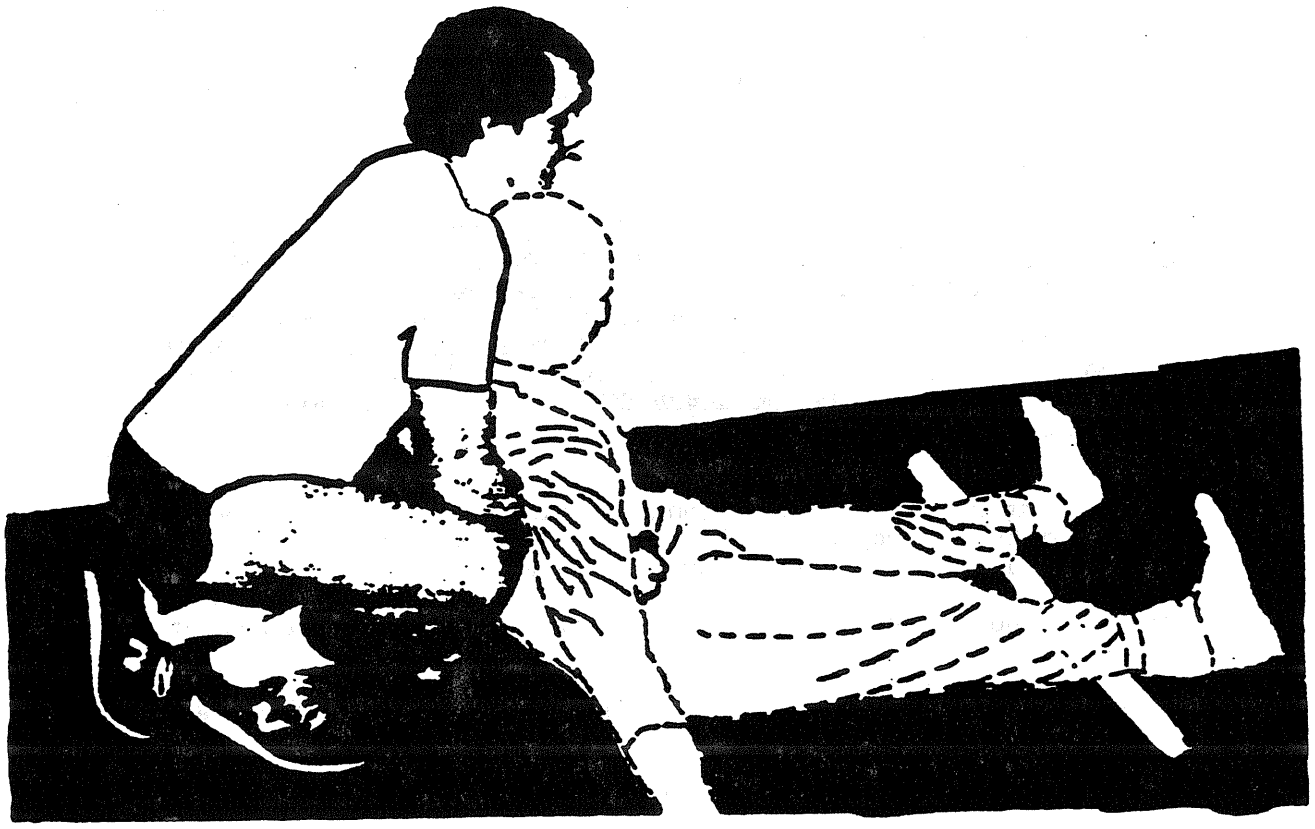
6. Instruct student to lift dummy at starting position. Inform student that test will begin when the dummy's feet cross the starting line. Start test when the dummy's feet cross the starting line.

7. Clock time that it takes student to drag dummy's feet across finish line. Record time to the nearest tenth of a second on student's test form.

8. Allow student to rest at least two minutes.

9. Retest student following same procedures.

NOTE: It is important that students be thoroughly warmed up prior to this test. Particularly important are low back stretching exercises.



Station D - Fence Climbs

Materials:

Stopwatch, traffic cones (8), matting to cover side supports of fence, fence, 6' x 6' gym mat. (See test materials description.)

Setup:

1. Position fence in center of a stretch of level, dry ground approximately 50 yards in length. Surface must be packed dirt or short grass (not pavement or long grass). Put matting on side support rails and behind fence (students are to land on the gym mat after going over fence).

2. Measure and mark start lines 5 yards from each side of fence, and finish lines 25 yards from each side of fence. Use two traffic cones to mark each line.

3. If two separate fences are utilized, the solid fence must be made of wood (not brick or concrete block).

Procedures:

1. INSTRUCTIONS TO STUDENT: "Two tests of your ability to climb over fences will be administered at this station. Both fences are six feet high. One fence is solid wood and the other is chain link. A statewide job analysis showed that these are the two most common types of fences encountered by entry-level patrol officers.

   The amount of time it takes you to climb the fences will be recorded. For each test you are to run up to the fence, scale the fence, and continue running to the finish line. Each test will be administered twice with at least a two-minute rest period between administrations. Your fastest time will be utilized as your score.

   You may use any method you wish to get over the fences. However, you may not use the side supports in any manner to get over the fences. If you do, you will be scored as if you had failed to get over the fence. If you are unsuccessful in your first attempt to get over a fence, continue trying until you succeed."

2. Position student at start line for 6' chain link fence climb (5 yards from fence).

3. Inform student that he/she:

   a. is to approach and climb fence and run to finish line beyond fence as quickly as possible;

   b. may use any method to climb fence as long as side supports are not used;

   c. may continue trying to climb fence if not successful in first attempt;

   d. will be tested twice on each fence;

   e. will be tested twice on the chain link fence before being tested on the solid fence;

   f. will be instructed to start the test with command, "ready, go."

4. Demonstrate a proper approach to going over the fence (with student observing).

5. Assume position adjacent to fence, set stopwatch at zero and start test with command, "ready, go."

6. Observe whether student uses side supports to get over fence. Consider candidate to have failed to clear fence if he/she uses side support.

7. Clock and record time on student's test form. Record time to the nearest tenth of a second.

8. Allow student at least two minutes to rest.

9. Re-administer test following same procedures.

10. Allow student to rest at least two minutes.

11. Position student at start line for solid wood fence test.

12. Move gym mat to chain link side of fence.

13. Repeat Steps 4 through 9.

Station E - 500 Yard Run

Materials: Stopwatch, measuring tape, traffic cones (2).

Setup:

1. Test is to be given on a standard 440-yard athletic track. Measure and mark start/finish lines with traffic cones.

Procedures:

1. INSTRUCTIONS TO STUDENT: "This test simulates a long distance foot pursuit and requires that you run 500 yards. The test consists of running 1 lap plus 60 yards around the track.

   When taking the test, try to pace yourself at about 3/4 speed for the first lap (considerably faster than a jog, but slower than a sprint). Do not try to sprint the entire distance. The test will be administered only once."

2. Instruct student to warm-up by stretching and jogging in place.

3. Position student at start line.

4. Set stopwatch at zero and start test with command, "ready, go."

5. Approach finish line as student approaches finish line.

6. Clock and record time taken to complete run on student's test form. Record time to nearest tenth of a second.

7. Review student's test form to confirm that all test scores have been recorded.

8. Observe student during cool-down. Encourage student to walk around. Discourage student from lying or sitting down. Notify appropriate personnel if student exhibits signs of physical distress (dizziness, nausea, pallor, cold sweat, etc.).

Example Data Collection Form

Work Sample Test Battery

Student's Name: _____

Date: _____

Test Scores (time in seconds)				
	1st Trial	2nd Trial	Best	Points*
Agility Run	___ . __	___ . __	___ . __	___ . __
Body Drag	___ . __	___ . __	___ . __	___ . __
Chain Link Fence	___ . __	___ . __	___ . __	___ . __
Solid Fence	___ . __	___ . __	___ . __	___ . __
500 Yard Run			___ . __	___ . __
		TOTAL POINTS (SCORE):		___ . __

*See conversion charts in Appendix I (page 135) of manual.

D. Test Scoring Procedures

Because a student's total test performance is the best indication of his/her overall ability to perform the physical demands of the job, scores on the individual tests of the Work Sample Test Battery are combined to arrive at a total test score for each student. Scoring the tests in this manner, as opposed to scoring each individual test on a pass/fail basis, allows students to compensate for performing less than optimally on one test by performing extremely well on other tests.

Prior to combining scores, the scores on each individual test must be converted to T-scores and then weighted. This procedure places scores on the different tests on the same scale of measurement and assures that they carry a weight proportionate to their actual importance or likelihood of occurrence on the job. Since this procedure necessarily entails the use of statistical formulas requiring a working familiarity with advanced mathematical principles, a score conversion table has been provided for each test event. These tables appear in Appendix I. An abridged version of these tables is shown in Table 10. Each column corresponds to one of the tables in Appendix I. Shown in the tables are the scores that correspond to different "raw" time values achieved on the individual tests. As an illustration, refer to Table 10. Under the "Chain Link Fence Climb" column, the first entry is 4.0 120. This entry indicates that a time of 4.0 (i.e., four and zero tenths) seconds on the Chain Link Fence Climb translates to a converted weighted score of 120 points (i.e., one hundred twenty points). As another example, refer to the bottom entry under the "Solid Fence Climb" column. The entry here of 15.6 50 means that a time of 15.6 (fifteen and six tenths) seconds on the Solid Fence Climb test is equivalent to a converted weighted score of 50 (fifty) points.

To determine the total score for each student, refer to the conversion tables in Appendix I, page 135 (do not use the abridged version of these tables shown in Table 10) and write the score equivalent for the student's best time on each test in the space provided on the student's Data Collection Form. Next, add up the points achieved on the five tests. The sum of these five values is the student's total score.

E. Minimum Standard

A minimum score of 384 must be obtained to demonstrate sufficient physical ability to perform as a patrol officer. Students who fail the Physical Abilities Test Battery on the first attempt shall: (a) be provided with their scores on the initial attempt; (b) have a reasonable period of time established by the academy to prepare for a retest; and (c) be provided with an opportunity to be retested on the same test. If a student fails the second test, the student fails the course.

Interim Test Not Scored

As indicated earlier, the primary purpose in administering the Work Sample Test Battery during the fourth to sixth week of the program is to aid staff in identifying students who have difficulty with particular Work Samples. The objective is to be able to provide such individuals with remediation prior to the final test. As such, it is not necessary, or recommended that the interim test be converted to points. For reference purposes, normative information is provided in Table 11.

Table 10

POST Work Sample Test Battery
Abridged Score Conversion Chart

99 Yard Obstacle Course		165 Pound Body Drag		Chain Link Fence Climb		Solid Fence Climb		500 Yard Run		
Time*	Points	Time*	Points	Time*	Points	Time*	Points	Time*	Points	
14.0	248	2.7	61	4.0	120	4.0	224	54.3	50	
14.7	238	3.0	60	4.4	116	4.6	216	60.2	48	
15.4	229	3.4	59	4.7	113	5.2	207	66.1	46	
16.1	221	4.3	57	5.1	108	5.8	198	74.9	44	**Minimum Passing Score : 384**
16.8	212	5.1	55	5.5	104	6.3	191	80.0	43	
17.4	204	6.0	53	5.8	101	6.8	184	85.1	40	
18.2	197	6.4	52	6.2	99	7.0	170	90.2	37	
19.5	178	7.6	49	6.9	92	8.1	153	95.5	38	
20.1	170	8.4	46	7.4	82	9.8	141	98.4	35	
20.7.	162	9.8	43	8.0	77	10.4	133	101.4	34	
21.4	151	10.8	42	8.4	73	10.7	128	104.3	33	
22.8	136	11.0	41	8.7	70	11.2	121	107.3	32	
23.5	127	12.0	39	9.1	65	12.1	108	113.2	30	
24.2	119	12.8	37	9.5	61	12.7	100	119.0	28	
24.9	110	14.0	34	9.8	58	12.8	97	122.0	27	
26.2	93	15.6	30	10.7	48	14.0	81	127.9	25	
26.9	85	16.4	28	10.9	46	14.6	73	133.7	23	
27.6	76	17.2	26	11.3	42	15.1	66	139.6	21	
28.2	68	18.0	24	11.6	39	15.6	50	145.5	19	

*Time given in seconds

Table 11.

STUDENT WORK SAMPLE TEST NORMS FOR MALES AND FEMALES AT CONCLUSION OF 12 WEEKS OF TRAINING

(September 1986)

	Obstacle course		Body Drag		Solid Fence		Chain Fence		500 Yd Run		Total Points	
Percentile	M	F	M	F	M	F	M	F	M	F	M	F
90%	15.6	17.3	3.7	5.5	5.9	7.3	5.9	7.0	73.0	85.0	618	543
80%	16.1	18.2	4.0	5.8	6.2	7.7	6.1	7.4	75.6	90.0	604	533
70%	16.5	18.7	4.2	6.2	6.4	7.9	6.4	7.6	79.0	94.0	595	521
60%	16.9	19.0	4.4	6.5	6.6	8.2	6.5	7.9	81.0	97.0	587	510
50%	17.2	19.4	4.6	7.0	6.9	8.7	6.7	8.2	83.0	100.0	577	491
40%	17.6	19.7	4.8	7.6	7.0	9.4	6.9	8.4	85.0	102.0	568	478
30%	18.0	20.0	5.1	8.1	7.3	10.2	7.1	8.9	87.0	106.0	559	458
20%	18.3	20.5	5.1	8.8	7.6	10.8	7.4	9.4	90.0	108.5	546	438
10%	18.9	21.2	5.8	10.0	8.1	11.8	7.8	10.1	96.0	122.0	528	422
Best	14.2	15.8	2.6	4.0	5.0	5.4	4.9	5.8	61.1	74.0	655	611
Poorest	21.2	25.3	8.0	15.2	10.9	14.3	9.9	12.9	158.9	138.0	344	205
Mean	17.3	19.4	4.7	7.5	7.0	9.3	6.8	8.4	84.0	101.6	573	483
Std Dev.	1.3	1.5	.8	1.9	.9	1.9	.8	1.3	10.1	13.5	39	60
N	524	103	527	103	527	102	527	103	526	102	527	103

F. POST GUIDELINES FOR EVALUATING ALTERNATIVE PHYSICAL ABILITY TESTS

Academies seeking approval to use an alternative to the POST Job-related Work Sample Test Battery must submit the following documents to the POST Standards and Evaluation Services Bureau:

- A written description of test content, including appropriate visual illustrations
- A detailed written description of test administration procedures
- A detailed written explanation of procedures used to score the test
- A formal validation report which explicitly describes:
  - local job analyses procedures and results including sampling considerations and statistical findings
  - test construction decisions
  - evidence of local job relatedness including data collection and analyses, methods and results
  - psychometric properties of the test
  - rationale and procedure utilized to establish the passing score

In reviewing the submitted documents, POST will adhere to the principles and requirements as set forth in the *Uniform Guidelines on Employee Selection Procedures*[6]. These guidelines, which have been adopted by agencies responsible for enforcing state and federal equal employment opportunity law, outline the technical requirements for developing and using job-related Employee Selection Procedures.

Those sections of the Guidelines which will define the focus of POST's review are as follows:

- Section 14A and 14B, or 14C or 14D - which set forth standards for "conducting" validity studies
- Section 15B or 15C or 15D - which set forth standards for "reporting" validity studies
- Section 5H - which sets forth standards for establishing "cutoff scores"

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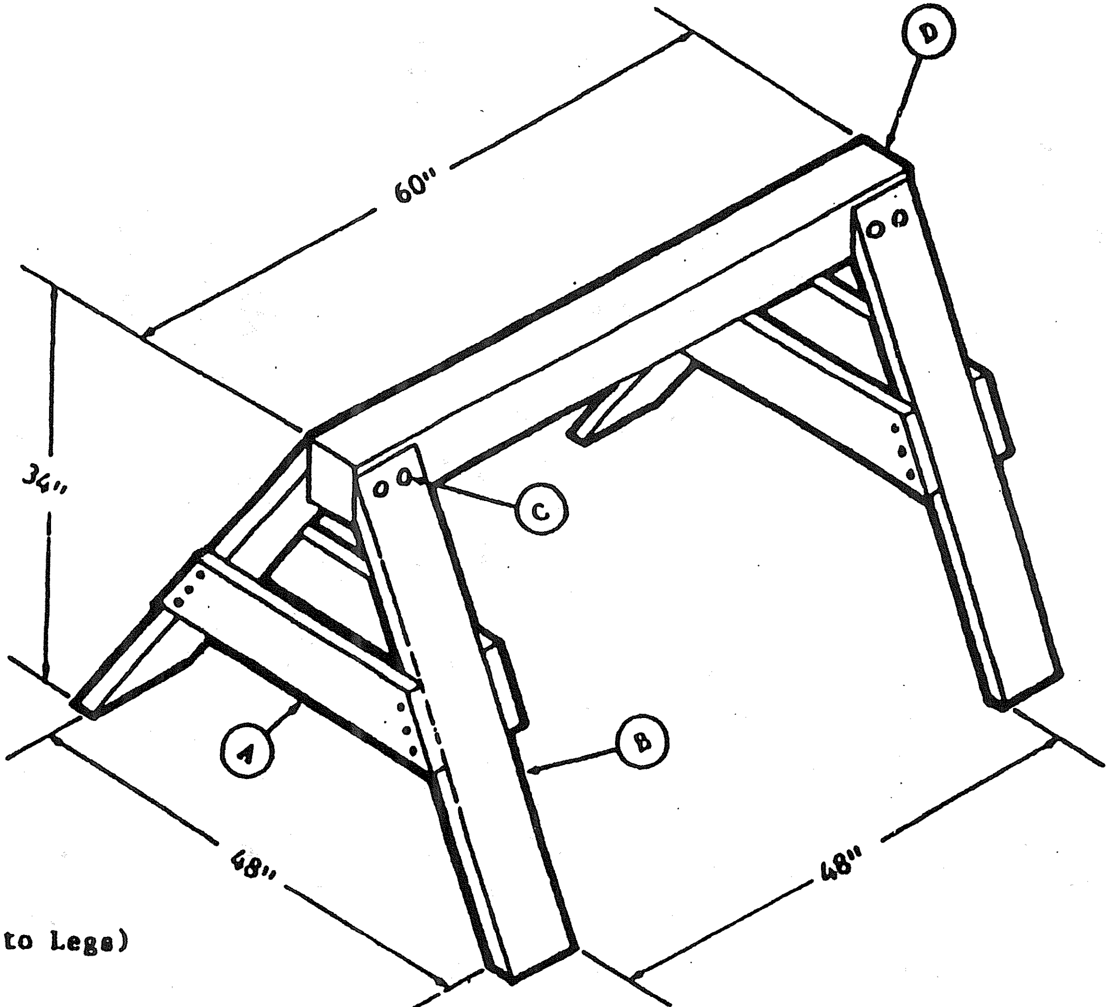
[6]Published in the Federal Register, Volume 43, No. 166 - August 25, 1978.

G. Materials Description



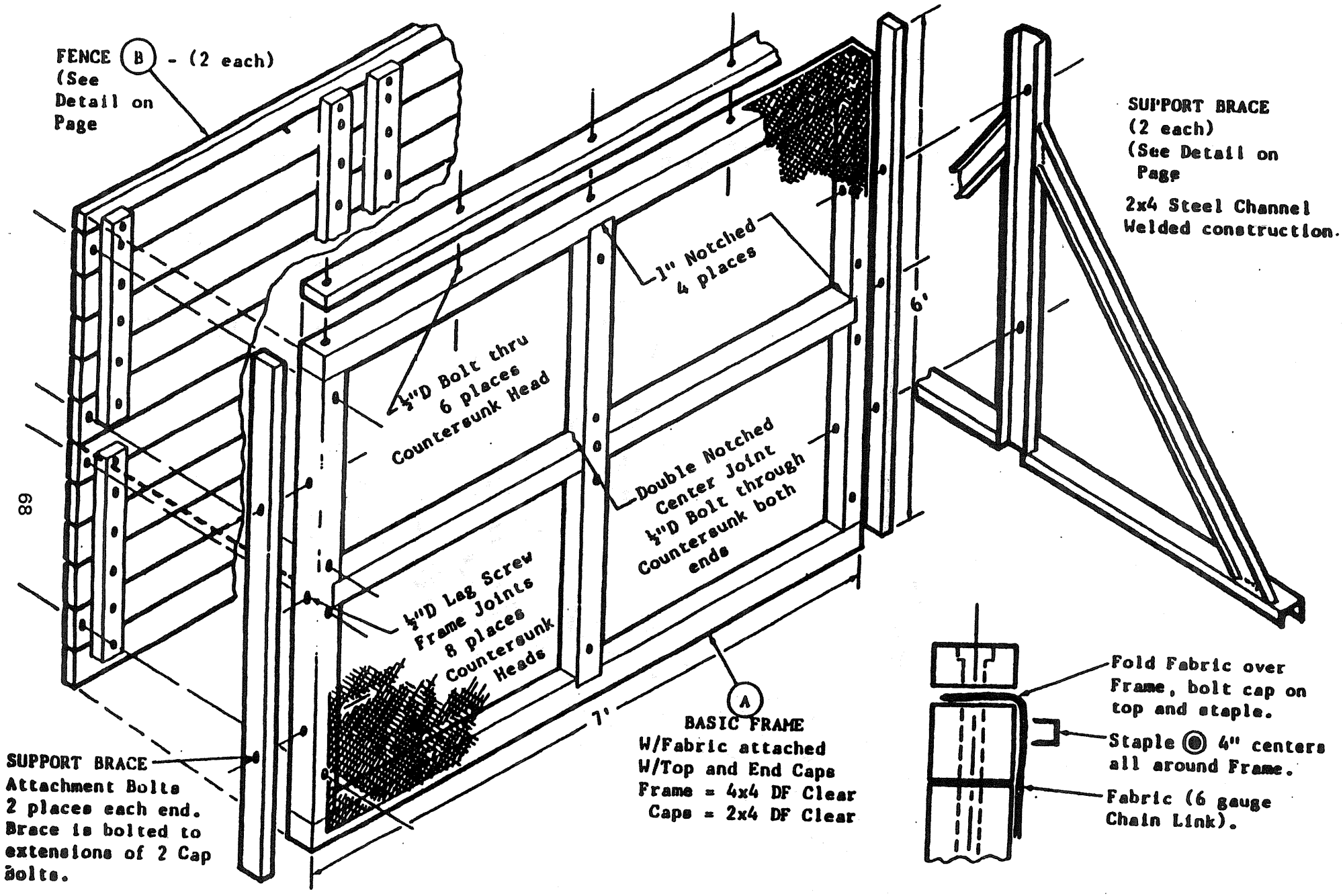
Ⓐ 2"x6"x3' GUSSET
4 required (Nail to Legs)

Ⓑ 2"x6"x3'-6" LEG
4 required (Bolt to Beam)

Ⓒ ½"Dx6" LAG BOLT & FLAT WASHER
8 Required

Ⓓ 8"x8"x5' BEAM
Railroad Tie OK if clear and clean

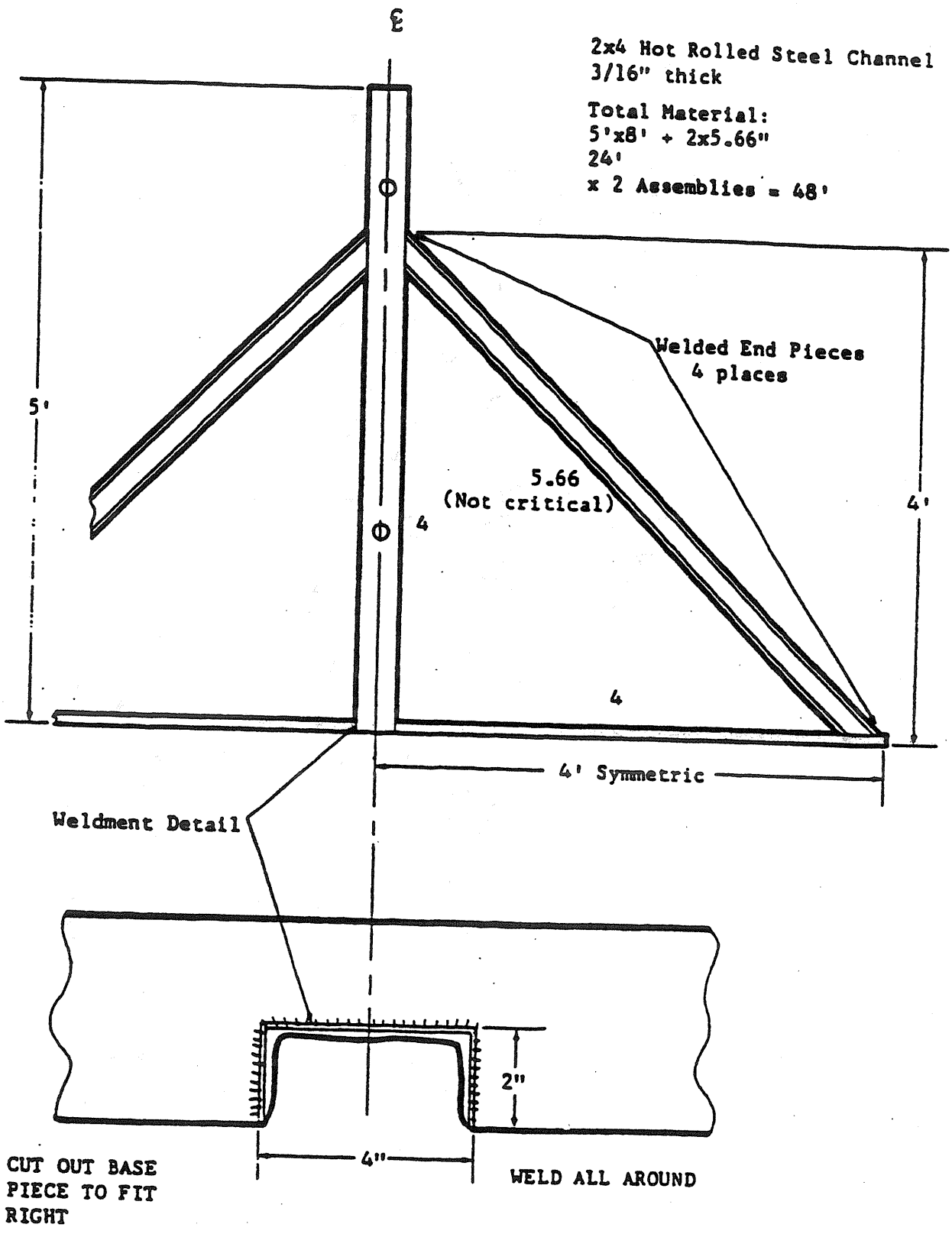
34" High Obstacle

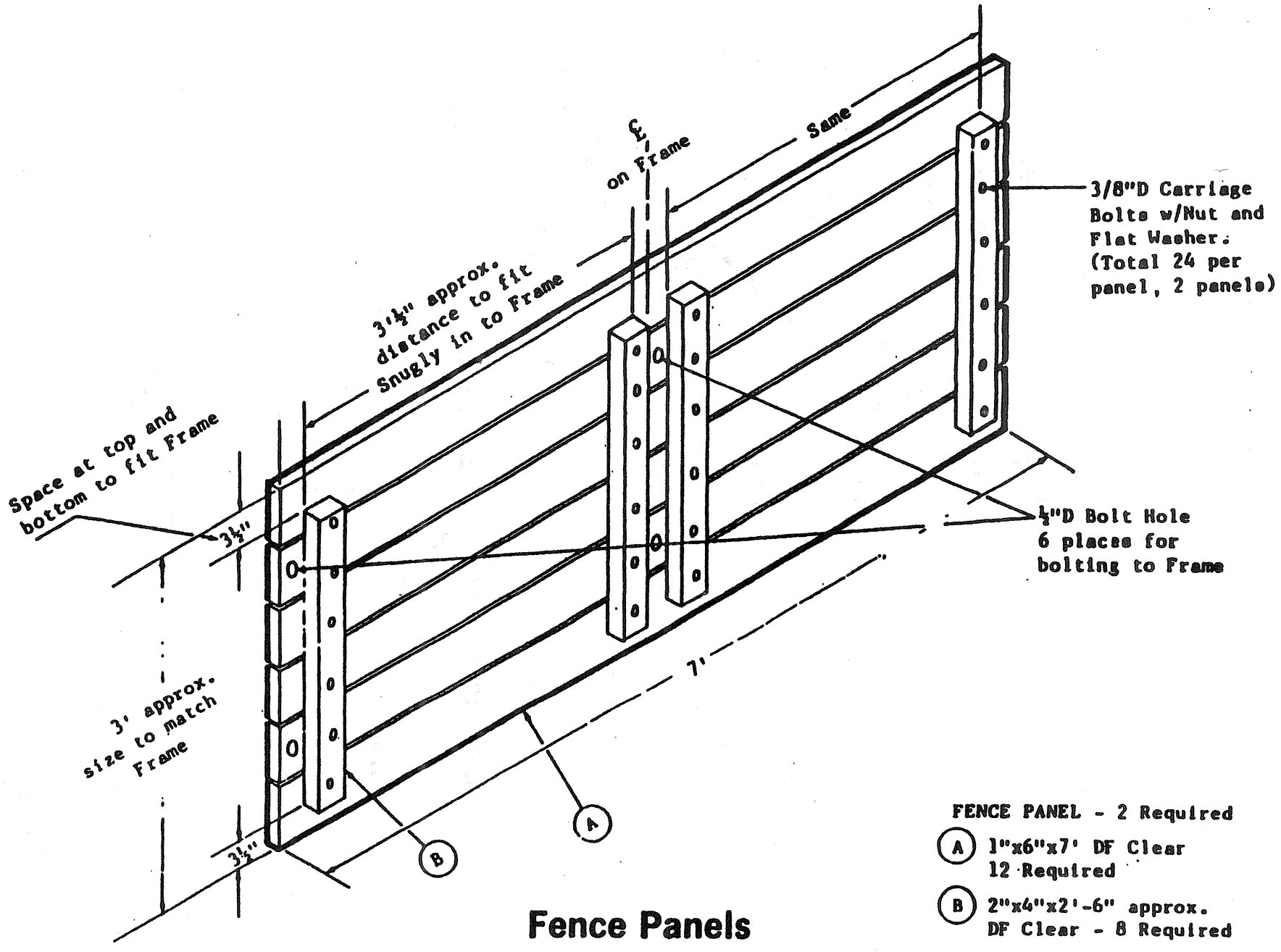


89

Combination Chain Link and Solid Fence

Fence Support Braces





Fence Panels

FENCE PANEL - 2 Required

(A) 1"x6"x7' DF Clear 12 Required

(B) 2"x4"x2'-6" approx. DF Clear - 8 Required

Table 12

Materials and Equipment List for Work Sample Test Battery

Test	Setup	Administration	Specifications/ Manufacturer of Equipment used by POST (major equipment only)
Station A: Initial Screening		Data Collection Forms, Pencils	
Station B: Obstacle Course	Measuring tape, Traffic cones (18), Cord (250 ft), 6"x6"x3' Curbs (3), 34" high obstacle	Stopwatch	(See Attached Diagram, page 67)
Station C: Body Drag	Measuring tape, Tape to mark start/finish lines, Traffic cones (4)	Stopwatch, 165-pound dummy	Purchase from: Janak & Scurfield* Dummies Unlimited**
Station D: Obstacle Climbs	Traffic cones (8), Matting to cover fence supports, Gym mat (6' X 6'), Fence	Stopwatch	(See Attached Diagram)***
Station E: 500-yard Run	Measuring tape, Traffic cones (2)	Stopwatch	

* Janak & Scurfield, Inc., Sacramento, CA, (800) 852-7166 Cost $695
** Dummies Unlimited, Chino, CA, (909) 590-8161 Cost $495
*** Note that diagram is for combination chain link and solid fence.

CHAPTER SIX

RECOMMENDED MEDICAL AND ROUTINE/EMERGENCY FIRST AID PROCEDURES

A. Medical Prescreening

POST strongly recommends that all students who participate in the Basic Academy Physical Conditioning Program be screened by a physician and specifically cleared to participate in the program.

The likelihood that some type of physical injury will occur during a physical training program should always be considered. Since the costs associated with certain kinds of physical injury can be staggering, and since the chances of detecting and thus preventing injury are significantly increased by medical prescreening, POST strongly recommends that all academies institute a medical clearance procedure.

A prototype procedure which academies may elect to utilize is presented in Appendix J. The recommended procedure includes a letter to prospective students that outlines the program and calls for them to obtain a medical clearance at their expense. Included with the letter are a Medical History Questionnaire, and a cardiac risk assessment test which the student completes and brings to the examining physician. Additionally, there is a letter to the physician which describes the program in some detail, refers to the Risk Assessment and Medical History Questionnaire (which the student must provide to the physician), and contains a copy of the American College of Sports Medicine's Guidelines For Graded Exercise Testing and Exercise Prescription.

B. Emergency and Routine First Aid Procedures

It is of the utmost importance that the staff associated with the Basic Course Physical Conditioning Program be familiar with emergency and first aid procedures. All staff should be currently certified in First Aid and Cardiopulmonary Resuscitation. The American College of Sports Medicine makes the following recommendations with regard to emergency procedures:

1. All personnel concerned with an exercise program should be trained in cardiopulmonary resuscitation at the basic rescue level.

2. When possible, a staff member should be trained in Advanced Cardiac Life Support.

3. Emergency equipment and drugs should be available in the immediate area or through a mobile emergency unit and telephone call system.

4. Telephone numbers for emergency assistance should be clearly posted at all telephones.

5. Evacuation plans should be established and posted. Every staff person should be thoroughly familiar with all specific duties and evacuation procedures required in an emergency.

6. Procedures should be reviewed and practiced on a regularly scheduled basis.

Appendix F (page 115) includes two publications which address emergency first aid procedures: *CPR in Basic Life Support for Cardiac Arrest* (American Heart Association) and "Warnings and What to do About Them" from *Exercise Your Way to Fitness and Heart Health* by L. Zohman. A supplemental reference is the *First Aid Manual* published by the American Medical Association.

APPENDIX A

PROTOCOLS AND SCORING FORMS FOR PHYSICAL ABILITY TESTS TO BE USED FOR INITIAL ASSESSMENT, INTERIM ASSESSMENT AND STUDENT SELF EVALUATION

This appendix contains the test administration protocols for six (6) Physical Ability tests that are to be used for Initial Assessment, Interim Assessment, and Student Self Evaluation. Included also are procedures for determining resting heart rate and blood pressure, a physical ability test progress chart and a table of student norms.

Norms-Motivation

Following the test protocols and progress chart is a table entitled Student Physical Ability Test Norms. This table presents test score information in terms of accelerated, average and below average test scores. Research has shown that this type of normative information has a positive motivational effect on trainees; people like to know how they are doing compared to other people. Instructors should post this table (or a similar table of locally developed norms) where all students can read it.

Progress Chart-Motivation

A form entitled "Physical Ability Test Progress Chart" is also included in this appendix. This chart is intended to serve three purposes. First, it provides a means for staff to record the scores achieved by the student on all six tests. Second, it provides space for the student or staff to enter the results of assessments that are made at various points during the course of the program. Finally, as indicated earlier, research shows that feedback is a very effective motivational tool. The progress chart is a tool to provide students with feedback about their efforts. As such, a chart which contains individual test scores should be prepared and given to each student. Moreover, the results of any re-administrations of these tests (whether by staff or the student on his/her own) should be recorded on this or a similar form.

When to Administer

Staff should plan to administer the physical ability tests on at least two occasions during the program: once at (or near) the beginning of the program and once near the end.

Prescreening Precaution

As mentioned in Chapter Two, POST strongly recommends that each student's resting heart rate and blood pressure be taken immediately prior to the first (initial) administration of the physical ability test or the first exercise session. Protocols for obtaining Resting Heart Rate (RHR) and Resting Blood Pressure (RBP) are provided in the Appendix. These procedures need not be followed during any subsequent administration of these tests. The reasons that it is important to obtain RHR and RBP prior to the first test or exercise administration are: (1) that a significant amount of time may have elapsed since the student was screened by a physician and has since developed a problem; and (2) that the student may not have been medically screened by a physician, and hence may be at risk.

Another precaution which should be followed prior to any testing or conditioning session is to ask the class if anyone has a current (new) injury or other medical problem (such as being on medication) which may affect their ability to take the tests or participate in training.

Warm-Up and Cool-Down

As is true regarding any vigorous physical effort, muscles and bodily systems must be warmed-up prior to exertion and sensibly cooled-down following the exertion. Instructors should assure that students are properly warmed-up and cooled-down on those days when the physical ability tests are administered. Recommended warm-up and cool-down activities are presented in Table 5, page 32.

Protocols

Detailed protocols for administering each of the six physical ability tests are provided in this appendix. These protocols should be strictly adhered to when administering these tests.

Determining Student Resting Heart Rate (RHR)

Instructions: Student must remain seated in a quiet location for ten minutes. Place stethoscope just to the left of the sternum between the fourth and fifth intercostal. Begin keeping time on a heart beat. Count the number of heart beats that occur in 20 seconds. Multiply this value by three to determine RHR. If RHR is greater than 90, retest the student at five minute intervals until RHR is less than 90. If after ten minutes RHR remains greater than 90, allow the student to rest in a reclined position for ten minutes before taking the final reading. If RHR still exceeds 90, defer the student from testing pending medical clearance from a physician. Record the final RHR on the student's test form.

Measuring Student Resting Blood Pressure (RBP)

Instructions: To be taken immediately after RHR. Student must remain seated in a quiet location. Attach blood pressure cuff snugly to student's dominant arm just above the elbow. Make sure there are no folds in cuff. Attach measurement dial to top of cuff. Place stethoscope on the artery which runs next to and outside of the biceps tendon at the elbow. Student's cuff arm should be fully extended forward and supported at approximately chest height. Close valve and pump cuff until dial reading is 180-200 mmHg. Open valve and let air bleed slowly while listening for first and last audible heart beats (which correspond to the systolic and diastolic pressures, respectively). If systolic reading exceeds 140 or diastolic reading exceeds 95, place cuff on student's non-dominant arm and repeat procedure. If readings exceed allowable maximums, return cuff to student's dominant arm and take readings at five minute intervals. If after ten minutes the reading still exceeds 140/95, allow the student to rest in a reclined position for ten minutes before taking the final reading. If blood pressure still exceeds 140/95, defer the student from testing pending medical clearance from a physician. Record final RBP's on student's test form.

PUSH-UPS

MATERIALS: Gym mat

PROCEDURES:

1. Instructions to student: "This test measures the dynamic strength and endurance of the arm, chest, and shoulder muscles. You are to perform as many push-ups in proper form as you can. This test will be administered once."

2. Demonstrate the correct technique: (1) Place the arms close to the shoulders and assume a front leaning rest position with arms extended; (2) keep body flat and rigid; (3) lower body so that chest is within 2 inches of the ground by bending the elbows; (4) return to the starting position.

3. Check for improper technique: (1) bending the back; (2) not lowering to within 2 inches of the ground.

4. Record the number of properly executed push-ups.

1.5 MILE RUN

MATERIALS: Stopwatch, distance measuring device, traffic cones.

SETUP: Measure a 1.5 mile distance, preferably on a track. Mark start and finish lines with traffic cones.

PROCEDURE:

1. Instructions to student: "This test measures your cardiorespiratory or aerobic endurance. You are to run the 1.5 miles as quickly as you can. This test will be administered once.

2. Position student at the start line.

3. Set stopwatch to zero and start test with the command, "ready, go."

4. Clock and record time to the nearest tenth of a second.

5. Observe student during cool-down. Encourage student to walk around; discourage student from lying or sitting down.

1 MINUTE BENT-KNEE SIT-UPS

MATERIALS: Gym mat, timer or stop-watch

PROCEDURES:

1. Instructions to student: This test measures the dynamic strength and endurance of the abdominal muscles. You are to lie in a supine position, with knees bent at a right angle, and feet shoulder-width apart. Place your hands at the side of your head with your fingers over the ears. Your elbows should be pointed toward your knees. Your hands and elbows must be maintained in these positions for the entire duration of the test. Also, your ankles must be held throughout the test by another person to ensure that your heels are in constant contact with the mat.

   You are required to sit up, touch your knees with your elbows and return to the starting position (shoulders touch floor). PERFORM AS MANY SIT-UPS AS POSSIBLE WITHIN ONE MINUTE. You may pause to rest whenever necessary.

2. Demonstrate the correct technique

   It is imperative that the student is clearly instructed in the correct performance of the sit-up. The student should be informed to initiate the sit-up by flattening the lower back followed by actively contracting the abdominal muscles and then continuing the movement with a well-controlled "curling up" of the trunk to the point where the elbows touch the knees. This is followed by a "curling down" of the trunk with particular emphasis on the lower back fully contacting the mat before the upper back and shoulders touch the mat.

   A "rocking" or "bouncing" movement is not permitted. Also, the student's buttocks must remain in contact with the mat and the fingers in contact with the side of the head at all times. Have the student practice one or two repetitions to check for proper technique.

   Advise the student that incorrect repetitions, those not meeting the above criteria, will not be counted. The student should also be advised to avoid breath-holding by breathing rhythmically and to "exhale on effort"; i.e., exhale during "curling-up" phase of the sit-up.

When the student is fully informed of the preceding details and is ready to start the sit-up test, give the command "Begin" and start the timer.

WAIST/HIP RATIO

MATERIALS: Spring tension measuring tape

PROCEDURES:

1. Instructions to students: "This test measures your body composition in terms of the pattern of subcutaneous fat distribution. The measurement is made by comparing your waist circumference to your hip circumference."

2. Demonstrate proper technique:

   Waist (Abdomen) Girth

   The student stands erect. The instructor uses a cross-handed technique to position the tape horizontally at the level of noticeable waist narrowing. The tape is then placed in the recording position and the measurement is made at the end of a normal exhalation (breath). If there is no noticeable waist narrowing, take the measurement at the same level as the bottom of the rib cage when felt at the side. Be sure the tape is at the same horizontal level all the way around. Record the waist measurement.

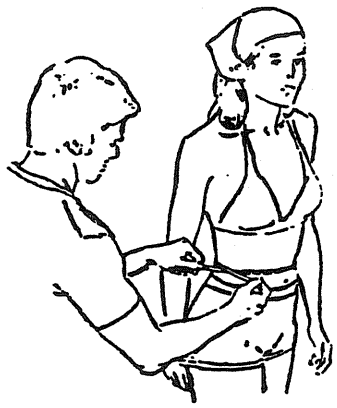
   Hip (Gluteal) Girth

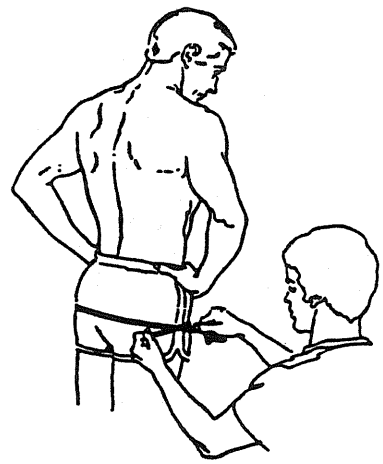
   The student stands erect with feet together. The tape is positioned at the level where the hips are the largest (usually near where the legs start).

   After performing each measurement once, take each measurement a second time. Do not perform the same measurement twice in a row. If the two measurements (for either hip or waist) are within 1 centimeter apart, take the average of the two measurements and record this value. If the two measurements are more that 1 centimeter apart, repeat the measurement until two values are within 1 centimeter. Take the average of the two measurements which are within 1 centimeter apart and record this value.

3. Record the waist to hip girth ratio. That is, divide the waist girth by the hip girth and record this number.

   (Waist Girth ÷ Hip Girth)





SIT AND REACH

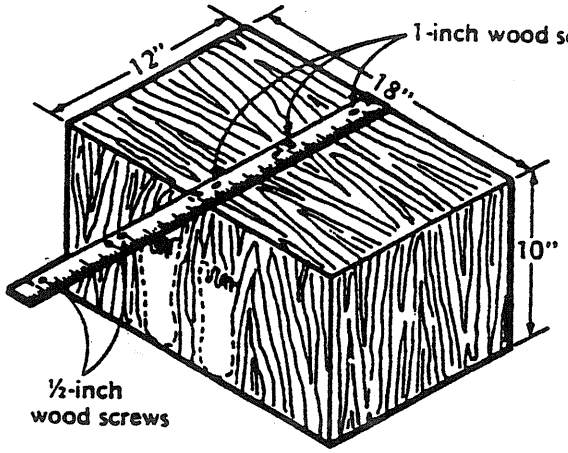
MATERIALS: Sit and Reach box.

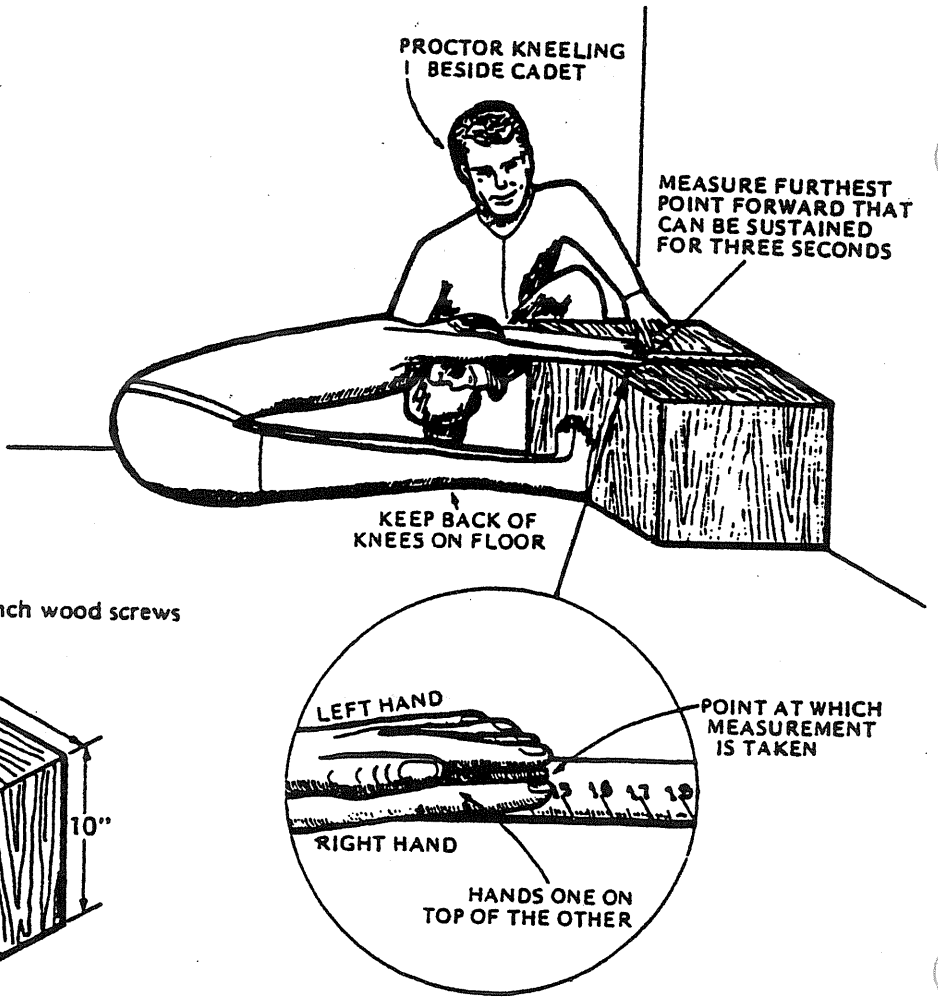
PROCEDURE:

1. Instructions to student: "This test measures the flexibility of the muscles in your lower back and hamstrings. You will be given three trials."
2. Instruct student to remove shoes.
3. Demonstrate the procedure: (1) legs are fully extended and the soles of the feet are placed flat against the sit and reach box; (2) hands placed one on top of the other; (3) the arms are extended as far forward as possible in a smooth motion and held for a count of three; (4) the point at the tip of the fingers is recorded.
4. Guard against the student's knees bending by keeping a hand on the knees to detect movement.
5. Caution the student against bouncing or jerking forward.
6. Three trials are given.

MATERIALS

½" X 2" X 24" board
Yardstick or 2-foot ruler
3 1-inch wood screws
2 ½-inch wood screws
Glue
1 ¼-inch box nails
1 ½" X 12" X 18" plywood (top)
1 ½" X 10" X 18" plywood (front)
2 ½" X 10" X 12" plywood (sides)
Box has no back





Percent Body Fat
(Skinfold Measurement)

Materials: Harpenden or Lange skinfold calipers

Procedures:

1. Instructions to Participants: "This test estimates your percentage of body fat by measuring the thickness of the layer of fat beneath the skin at three different places."

2. Note: This procedure requires a relatively high level of technical proficiency or inaccuracies are likely to result. It is recommended that the person who takes the skinfolds be formally trained in skinfold measurement technique. If no one is so trained, this test may be omitted.

   All measurements should be taken on the non-dominant side. Perform all three measurements once, then repeat all three again. Do not take the same measurement twice in a row. If the two measurements for any site differ by more than one millimeter, repeat the measurement. If necessary, continue to repeat the measurement until two measurements at the same site are within one millimeter. Record each measurement in the space provided on the POST Fitness Battery Score Sheet.

   When taking measurements, grasp skinfold between thumb and index finger so as to include two thicknesses of skin and subcutaneous fat but no muscle tissue. (Make sure that all skin and fat are pulled away from underlying muscle.) If in doubt regarding the presence of muscle tissue, ask person to contract muscle. Apply calipers approximately one centimeter above fingers. Hold calipers with slight inward pressure at a depth approximately equal to the thickness of the fold.

3. For males, take the skinfold measurements at the chest, abdomen, and thigh.

4. For females, take the skinfold measurements at the tricep, suprailiac (hip) and thigh.

5. The correct procedure for taking these skinfolds is illustrated in Figures 1-5.

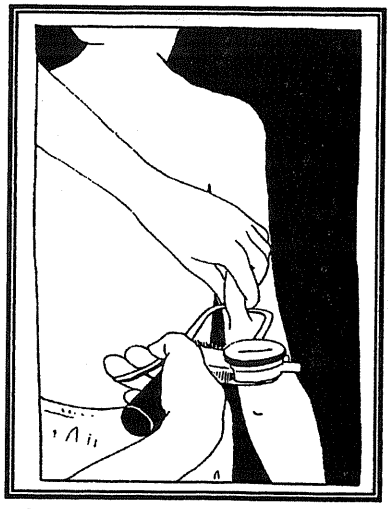


Figure 1 Tricep site
(Female only)

Figure 2 Chest Site
(Male only)

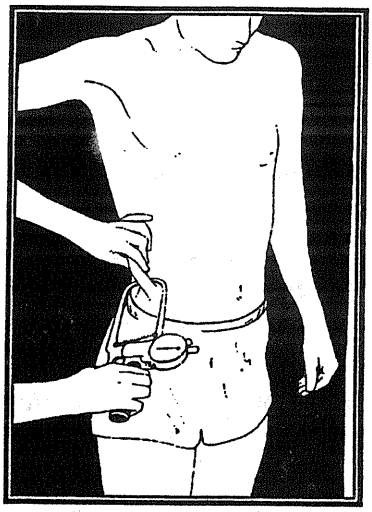


Figure 3 Suprailiac Site
(Female only)

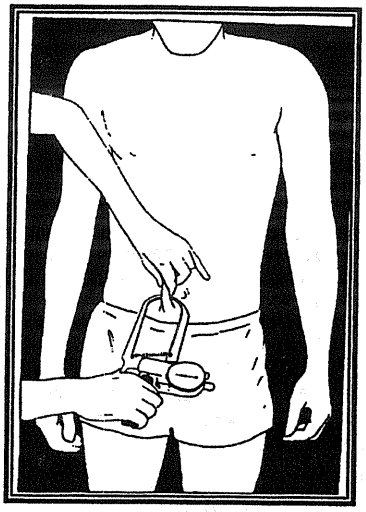


Figure 4 Abdomen site
(Male only)

6. Calculate percent body fat using the attached tables for males and females:

Figure 5 Thigh Site
(Male and Female)

First, calculate the sum the three skinfold measurements (i.e., add up the **chest, abdomen** and **thigh** for males and **triceps, suprailiac,** and **thigh** for females) in millimeters.

Then, go to Table A (for Males) or Table B (for Females) and find the sum (mm) in the left-hand column. Look in the row across from the sum (mm) under the person's age.

Percent Body Fat equals the number that appears in the cell under the person's age and across from his/her sum of skinfolds (mm).

TABLE A: PERCENT BODY FAT CONVERSION TABLE FOR MALES

Estimation of relative body fat, by percent*, in men from the sum of chest, abdominal, and thigh skinfolds (from Pollock, et al. 1980).

Age to Last Year Sum of Skinfolds (mm)	Under 22	23 to 27	28 to 32	33 to 37	38 to 42	43 to 47	48 to 52	53 to 57	Over 58
8-10	1.3	1.8	2.3	2.9	3.4	3.9	4.5	5.0	5.5
11-13	2.2	2.8	3.3	3.9	4.4	4.9	5.5	6.0	6.5
14-16	3.2	3.8	4.3	4.8	5.4	5.9	6.4	7.0	7.5
17-19	4.2	4.7	5.3	5.8	6.3	6.9	7.4	8.0	8.5
20-22	5.1	5.7	6.2	6.8	7.3	7.9	8.4	8.9	9.5
23-25	6.1	6.6	7.2	7.7	8.3	8.8	9.4	9.9	10.5
26-28	7.0	7.6	8.1	8.7	9.2	9.8	10.3	10.9	11.4
29-31	8.0	8.5	9.1	9.6	10.2	10.7	11.3	11.8	12.4
32-34	8.9	9.4	10.0	10.5	11.1	11.6	12.2	12.8	13.3
35-37	9.8	10.4	10.9	11.5	12.0	12.6	13.1	13.7	14.3
38-40	10.7	11.3	11.8	12.4	12.9	13.5	14.1	14.6	15.2
41-43	11.6	12.2	12.7	13.3	13.8	14.4	15.0	15.5	16.1
44-46	12.5	13.1	13.6	14.2	14.7	15.3	15.9	16.4	17.0
47-49	13.4	13.9	14.5	15.1	15.6	16.2	16.8	17.3	17.9
50-52	14.3	14.8	15.4	15.9	16.5	17.1	17.6	18.2	18.8
53-55	15.1	15.7	16.2	16.8	17.4	17.9	18.5	18.1	19.7
56-58	16.0	16.5	17.1	17.7	18.2	18.8	19.4	20.0	20.5
59-61	16.9	17.4	17.9	18.5	19.1	19.7	20.2	20.8	21.4
62-64	17.6	18.2	18.8	19.4	19.9	20.5	21.1	21.7	22.2
65-67	18.5	19.0	19.6	20.2	20.8	21.3	21.9	22.5	23.1
68-70	19.3	19.9	20.4	21.0	21.6	22.2	22.7	23.3	23.9
71-73	20.1	20.7	21.2	21.8	22.4	23.0	23.6	24.1	24.7
74-76	20.9	21.5	22.0	22.6	23.2	23.8	24.4	25.0	25.5
77-79	21.7	22.2	22.8	23.4	24.0	24.6	25.2	25.8	26.3
80-82	22.4	23.0	23.6	24.2	24.8	25.4	25.9	26.5	27.1
83-85	23.2	23.8	24.4	25.0	25.5	26.1	26.7	27.3	27.9
86-88	24.0	24.5	24.1	25.7	26.3	26.9	27.5	28.1	28.7
89-91	24.7	25.3	25.9	25.5	27.1	27.6	28.2	28.8	29.4
92-94	25.4	26.0	26.6	27.2	27.8	28.4	29.0	29.6	30.2
95-97	26.1	26.7	27.3	27.9	28.5	29.1	29.7	30.3	30.9
98-100	26.9	27.4	28.0	28.6	29.2	29.8	30.4	31.0	31.6
101-103	27.5	28.1	28.7	29.3	29.9	30.5	31.1	31.7	32.3
104-106	28.2	28.8	29.4	30.0	30.6	31.2	31.8	32.4	33.0
107-109	28.9	29.5	30.1	30.7	31.3	31.9	32.5	33.1	33.7
110-112	29.6	30.2	30.8	31.4	32.0	32.6	33.2	33.8	34.4
113-115	30.2	30.8	31.4	32.0	32.6	33.2	33.8	34.5	35.1
116-118	30.9	31.5	32.1	32.7	33.3	33.9	34.5	35.1	35.7
119-121	31.5	32.1	32.7	33.3	33.9	34.5	35.1	35.7	36.4
122-124	32.1	32.7	33.3	33.9	34.5	35.1	35.8	36.4	37.0
125-127	32.7	33.3	33.9	34.5	35.1	35.8	36.4	37.0	37.6

*Percent fat calculated by the formula by Siri: Percent Fat = [(4.95/BD) - 4.5] * 100, where BD = Body density.

TABLE B: PERCENT BODY FAT CONVERSION TABLE FOR FEMALES

Estimation of relative body fat, by percent*, in women from the sum of triceps, suprailiac, and thigh skinfolds (from Pollock, et al. 1980).

Age to Last Year / Sum of Skinfolds (mm)	Under 22	23 to 27	28 to 32	33 to 37	38 to 42	43 to 47	48 to 52	53 to 57	Over 58
23-25	9.7	9.9	10.2	10.4	10.7	10.0	11.2	11.4	11.7
26-28	11.0	11.2	11.5	11.7	12.0	12.3	12.5	12.7	13.0
29-31	12.3	12.5	12.8	13.0	13.3	13.5	13.8	14.0	14.3
32-34	13.6	13.8	14.0	14.3	14.5	14.8	15.0	15.3	15.5
35-37	14.8	15.0	15.3	15.5	15.8	16.0	16.3	16.5	16.8
38-40	16.0	16.3	16.5	16.7	17.0	17.2	17.5	17.7	18.0
41-43	17.2	17.4	17.7	17.9	18.2	18.4	18.7	18.9	19.2
44-46	18.3	18.6	18.8	19.1	19.3	19.6	19.8	20.1	20.3
47-49	19.5	19.7	20.0	20.2	20.5	20.7	21.0	21.2	21.5
50-52	20.6	20.8	21.1	21.3	21.6	21.8	22.1	22.3	22.6
53-55	21.7	21.9	22.1	22.4	22.6	22.9	23.1	23.4	23.6
56-58	22.7	23.0	23.2	23.4	23.7	23.9	24.2	24.4	24.7
59-61	23.7	24.0	24.2	24.5	24.7	25.0	25.2	25.5	25.7
62-64	24.7	25.0	25.2	25.5	25.7	26.0	26.7	26.4	26.7
65-67	25.7	25.9	26.2	26.4	26.7	26.9	27.2	27.4	27.7
68-70	26.6	26.9	27.1	27.4	27.6	27.9	28.1	28.4	28.6
71-73	27.5	27.8	28.0	28.3	28.5	28.8	29.0	29.3	29.5
74-76	28.4	28.7	28.9	29.2	29.4	29.7	29.9	30.2	30.4
77-79	29.3	29.5	29.8	30.0	30.3	30.5	30.8	31.0	31.3
80-82	30.1	30.4	30.6	30.9	31.1	31.4	31.6	31.9	32.1
83-85	30.9	31.2	31.4	31.7	31.9	32.2	32.4	32.7	32.9
86-88	31.7	32.0	32.2	32.5	32.7	32.9	33.2	33.4	33.7
89-91	32.5	32.7	33.0	33.2	33.5	33.7	33.9	34.2	34.4
92-94	33.2	33.4	33.7	33.9	34.2	34.4	34.7	34.9	35.2
95-97	33.9	34.1	34.4	34.6	34.9	35.1	35.4	35.6	35.9
98-100	34.6	34.8	35.1	35.3	35.5	35.8	36.0	36.3	37.2
101-103	35.3	35.4	35.7	35.9	36.2	36.4	36.7	36.9	37.2
104-106	35.8	36.1	36.3	36.6	36.8	37.1	37.3	37.5	37.8
107-109	36.4	36.7	36.9	37.1	37.4	37.6	37.9	38.1	38.4
110-112	37.0	37.2	37.5	37.7	38.0	38.2	38.5	38.7	38.9
113-115	37.5	37.8	38.0	38.2	38.5	38.7	39.0	39.2	39.5
116-118	38.0	38.3	38.5	38.8	39.0	39.3	39.5	39.7	40.0
119-121	38.5	38.7	39.0	39.2	39.5	39.7	40.0	40.2	40.5
122-124	39.0	39.2	39.4	39.7	39.9	40.2	40.4	40.7	41.9
125-127	39.4	39.6	39.9	40.1	40.4	40.6	40.9	41.1	41.4
128-130	39.8	40.0	40.3	40.5	40.8	41.0	41.3	41.5	41.8

*Percent fat calculated by the formula by Siri: Percent Fat = [(4.95/BD) - 4.5] * 100, where BD = Body density.

PHYSICAL ABILITY TEST NORMS

MALES

	accelerated	average	below average
1.5 Mile Run (min:sec)	less than 10:42	11:41-12:20	greater than 12:20
Sit and Reach (inches)	more than 16"	12"- 14"	less than 12"
Push-ups (reps)	more than 34 reps	22-27 reps	less than 22 reps
Sit-Ups (reps)	more than 41 reps	32-36 reps	less than 30 reps
% Body Fat (%)	less than 9%	12-18%	greater than 18%
Waist:Hip (ratio)	less than .81	.84-.87	greater than .87

FEMALES

	accelerated	average	below average
1.5 Mile Run (min:sec)	less than 12:51	14:24-15:10	greater than 15:10
Sit and Reach (inches)	greater than 19"	15"-17"	less than 15"
Push-ups (reps)	greater than 26 reps	15-20 reps	less than 15 reps
Sit-Ups (reps)	greater than 34 reps	24-29 reps	less than 29 reps
% Body Fat (%)	less than 19 %	23-25 %	greater than 25%
Waist:Hip (ratio)	less than .69	.73-.76	greater than .76

POST PHYSICAL ABILITY TEST PROGRESS CHART

		Weeks					
Test	**Initial Testing**	**2-3**	**4-5**	**6-7**	**8-9**	**10-11**	**12-13**
1.5 Mile Run (min - sec)							
Sit/Reach (inches)							
Push-ups (maximum)							
Sit-ups (1 min. max)							
Body Fat (%)							
Waist/Hip (Ratio)							

You are encouraged to evaluate yourself on these tests and to enter your scores in the appropriate cells.

If you are uncertain about how to conduct these tests, ask your instructor.

APPENDIX B

COMBATIVE SCENARIOS

COMBATIVE WORK SAMPLES

COMBATIVE SCENARIO #1

(1) Ward - taken into custody

Suspect (R) - Female, age 16, height 5' 4", weight 160 pounds

Subject - Officer X

Officers X and Y are dispatched to a single family, one-story residence with a warrant to arrest R on suspicion of a narcotics related parole violation. Upon arrival, officers find R and her elderly grandmother alone in the house; R is seated on a sofa. Officers inform R of the warrant and ask her to proceed to the patrol vehicle for transportation to a detention facility. R responds that she isn't going. After repeated reasoning efforts fail, officer X grabs R by the wrist and pulls her up from the sofa. R pulls away and runs to the door where she encounters officer Y, who stops her by grasping R by the right wrist. R pushes/shoves officer Y, whereupon officer X grasps R by the left wrist. R responds by slumping to floor and offering dead weight resistance. With both the grandmother and R screaming hysterically, officers release R and again try to reason with her. R again responds by crawling away. X stops R by grabbing her elbow after a 5-foot pursuit in the living room. Y immediately grasps the other arm. R then slumps to the floor, kicking at the officers. She is then handcuffed in the prone position by both officers and moved to the patrol vehicle, with the officers locking their arms behind her back and supporting her between them. R offers dead weight resistance during the move, a distance of 50 feet which includes passing through a doorway. At the vehicle, R enters the back seat on her own volition and power.

Total time of resisting incident: 1 minute, 30 seconds.

Degree of resistance - Moderate to strong.

COMBATIVE SCENARIO #2

Bar Room Fight

A Suspect - Male, 5' 9", 170 pounds, intoxicated

B Suspect - Male, 5' 9", 170 pounds, intoxicated

C Suspect - Male, 5' 9", 170 pounds, intoxicated

Subject - Officer X

Officers X and Y are dispatched to investigate a reported brawl at Bob's Tavern. Upon arrival at the tavern, a man wearing an apron approaches them, identifies himself as the owner/complainant and states that there are several patrons violently fighting inside. The officers request back up and then proceed into the tavern to investigate the complaint. Inside, they observe over a dozen men fighting among one another in the center of the room. The officers immediately identify themselves as police officers and order the combatants to break it up. At this command, all but three individuals stop fighting and run for the back door. The officers then unsuccessfully order the remaining three to stop, but they continue. The officers then step into the middle and push/shove the three men apart. One combatant then sits down on the floor, but the other two vigorously push/shove and attempt to pull away from Officers X and Y in order to continue beating the man who is sitting on the floor. Officer X takes suspect A down and wrestles with him to gain a control hold on the struggling suspect. Reinforcements then arrive and assist officer Y in controlling suspect B, who is cuffed and removed from the immediate area. Reinforcements then assist officer X, who has maintained the restraining hold on subject A without assistance for roughly 45 seconds. After being cuffed in the prone position, A continues to struggle and refuses to comply with orders to accompany officers to the patrol vehicle. X and three other officers then lift and carry A to the patrol vehicle, where X grasps the subject under one arm.

Distance - 45 feet.

Total time of combative activity: 2 minutes, 30 seconds.

Degree of Resistance - Strong.

COMBATIVE SCENARIO #3

PCP Suspect - Male, 5' 9", 170 pounds - PCP intoxicated

Subject - Officer X

Officers X and Y respond to a reported neighborhood disturbance and observe a young man, A, walking in the middle of the street reciting biblical passages in a very loud voice. X and Y, suspecting PCP intoxication, call for back up and follow A until a back up team of two officers arrives. X then approaches A and informs him that they will have to take him in for questioning. A remains calm, offers no resistance, submits to handcuffing and enters the rear of the patrol vehicle with no difficulty. A remains quiet as he is transported by X and Y to a hospital for medical evaluation. At the hospital A exits the vehicle and is escorted into the hospital by X and Y and the other two officers without incident. Inside the hospital, while in the waiting area of the emergency room, A suddenly breaks the handcuffs, strikes officer Y in the head, rendering him immediately unconscious, bolts out the door and runs down a hallway, jumping over chairs and dodging other patients in route. X and the other officers pursue A, jumping over chairs and dodging patients. X tackles A around the legs in the parking lot, about a 100-yard chase. The other officers immediately throw themselves onto A, who is on the ground, and attempt to restrain him so that medical personnel can sedate A via injection. A thrashes/struggles for 60 seconds as X maintains a bear hug around A's knees. Two medical assistants then join with the officers and, after about 20 seconds of positioning, manage to restrain movement of one arm long enough for a third medical assistant to administer the injection. A continues to struggle violently until the drug renders him unconscious - about 30 additional seconds. X fought for control of A's legs throughout the combative incident.

Total time of combative incident: 2 minutes, 5 seconds.

Degree of Resistance - Strong.

APPENDIX C

AMERICAN COLLEGE OF SPORTS MEDICINE
POSITION STAND ON
THE RECOMMENDED QUANTITY AND QUALITY OF EXERCISE
FOR DEVELOPING AND MAINTAINING FITNESS IN HEALTHY ADULTS

AMERICAN COLLEGE of SPORTS MEDICINE
POSITION STAND

The Recommended Quantity and Quality of Exercise for Developing and Maintaining Cardiorespiratory and Muscular Fitness in Healthy Adults

This Position Stand replaces the 1978 ACSM position paper, "The Recommended Quantity and Quality of Exercise for Developing and Maintaining Fitness in Healthy Adults."

Increasing numbers of persons are becoming involved in endurance training and other forms of physical activity, and, thus, the need for guidelines for exercise prescription is apparent. Based on the existing evidence concerning exercise prescription for healthy adults and the need for guidelines, the American College of Sports Medicine (ACSM) makes the following recommendations for the quantity and quality of training for developing and maintaining cardiorespiratory fitness, body composition, and muscular strength and endurance in the healthy adult:

1. Frequency of training: 3–5 $d \cdot wk^{-1}$.
2. Intensity of training: 60–90% of maximum heart rate (HR_{max}), or 50–85% of maximum oxygen uptake ($\dot{V}O_{2max}$) or HR_{max} reserve.[1]
3. Duration of training: 20–60 min of continuous aerobic activity. Duration is dependent on the intensity of the activity; thus, lower intensity activity should be conducted over a longer period of time. Because of the importance of "total fitness" and the fact that it is more readily attained in longer duration programs, and because of the potential hazards and compliance problems associated with high intensity activity, lower to moderate intensity activity of longer duration is recommended for the nonathletic adult.
4. Mode of activity: any activity that uses large muscle groups, can be maintained continuously, and is rhythmical and aerobic in nature, e.g., walking-hiking, running-jogging, cycling-bicycling, cross-country skiing, dancing, rope skipping, rowing, stair climbing, swimming, skating, and various endurance game activities.
5. Resistance training: Strength training of a moderate intensity, sufficient to develop and maintain fat-free weight (FFW), should be an integral part of an adult fitness program. One set of 8–12 repetitions of eight to ten exercises that condition the major muscle groups at least 2 $d \cdot wk^{-1}$ is the recommended minimum.

[1] Maximum heart rate reserve is calculated from the difference between resting and maximum heart rate. To estimate training intensity, a percentage of this value is added to the resting heart rate and is expressed as a percentage of HR_{max} reserve (85).

RATIONALE AND RESEARCH BACKGROUND

Introduction

The questions "How much exercise is enough," and "What type of exercise is best for developing and maintaining fitness?" are frequently asked. It is recognized that the term "physical fitness" is composed of a variety of characteristics included in the broad categories of cardiovascular-respiratory fitness, body composition, muscular strength and endurance, and flexibility. In this context fitness is defined as the ability to perform moderate to vigorous levels of physical activity without undue fatigue and the capability of maintaining such ability throughout life (167). It is also recognized that the adaptive response to training is complex and includes peripheral, central, structural, and functional factors (5,172). Although many such variables and their adaptive response to training have been documented, the lack of sufficient in-depth and comparative data relative to frequency, intensity, and duration of training makes them inadequate to use as comparative models. Thus, in respect to the above questions, fitness is limited mainly to changes in $\dot{V}O_{2max}$, muscular strength and endurance, and body composition, which includes total body mass, fat weight (FW), and FFW. Further, the rationale and research background used for this position stand will be divided into programs for cardiorespiratory fitness and weight control and programs for muscular strength and endurance.

Fitness versus health benefits of exercise. Since the original position statement was published in 1978, an important distinction has been made between physical activity as it relates to health versus fitness. It has been pointed out that the quantity and quality of ex-

ercise needed to attain health-related benefits may differ from what is recommended for fitness benefits. It is now clear that lower levels of physical activity than recommended by this position statement may reduce the risk for certain chronic degenerative diseases and yet may not be of sufficient quantity or quality to improve $\dot{V}O_{2max}$ (71,72,98,167). ACSM recognizes the potential health benefits of regular exercise performed more frequently and for a longer duration, but at lower intensities than prescribed in this position statement (13A,71,100,120,160). ACSM will address the issue concerning the proper amount of physical activity necessary to derive health benefits in another statement.

Need for standardization of procedures and reporting results. Despite an abundance of information available concerning the training of the human organism, the lack of standardization of testing protocols and procedures, of methodology in relation to training procedures and experimental design, and of a preciseness in the documentation and reporting of the quantity and quality of training prescribed make interpretation difficult (123,133,139,164,167). Interpretation and comparison of results are also dependent on the initial level of fitness (42,43,58,114,148,151,156), length of time of the training experiment (17,45,125,128,139, 145,150), and specificity of the testing and training (5,43,130,139,145A,172). For example, data from training studies using subjects with varied levels of $\dot{V}O_{2max}$, total body mass, and FW have found changes to occur in relation to their initial values (14,33,109, 112,113,148,151); i.e., the lower the initial $\dot{V}O_{2max}$ the larger the percentage of improvement found, and the higher the FW the greater the reduction. Also, data evaluating trainability with age, comparison of the different magnitudes and quantities of effort, and comparison of the trainability of men and women may have been influenced by the initial fitness levels.

In view of the fact that improvement in the fitness variables discussed in this position statement continues over many months of training (27,86,139,145,150), it is reasonable to believe that short-term studies conducted over a few weeks have certain limitations. Middle-aged sedentary and older participants may take several weeks to adapt to the initial rigors of training, and thus need a longer adaptation period to get the full benefit from a program. For example, Seals et al. (150) exercise trained 60–69-yr-olds for 12 months. Their subjects showed a 12% improvement in $\dot{V}O_{2max}$ after 6 months of moderate intensity walking training. A further 18% increase in $\dot{V}O_{2max}$ occurred during the next 6 months of training when jogging was introduced. How long a training experiment should be conducted is difficult to determine, but 15–20 wk may be a good minimum standard. Although it is difficult to control exercise training experiments for more than 1 yr, there is a need to study this effect. As stated earlier, lower doses of exercise may improve $\dot{V}O_{2max}$ and control or maintain body composition, but at a slower rate.

Although most of the information concerning training described in this position statement has been conducted on men, the available evidence indicates that women tend to adapt to endurance training in the same manner as men (19,38,46,47,49,62,65,68,90,92,122, 166).

Exercise Prescription for Cardiorespiratory Fitness and Weight Control

Exercise prescription is based upon the frequency, intensity, and duration of training, the mode of activity (aerobic in nature, e.g., listed under No. 4 above), and the initial level of fitness. In evaluating these factors, the following observations have been derived from studies conducted for up to 6–12 months with endurance training programs.

Improvement in $\dot{V}O_{2max}$ is directly related to frequency (3,6,50,75–77,125,126,152,154,164), intensity (3,6,26,29,58,61,75–77,80,85,93,118,152,164), and duration (3,29,60,61,70,75–77,101,109,118,152,162, 164,168) of training. Depending upon the quantity and quality of training, improvement in $\dot{V}O_{2max}$ ranges from 5 to 30% (8,29,30,48,59,61,65,67,69,75–77,82,84,96, 99,101,102,111,115,119,123,127,139,141,143,149, 150,152,153,158,164,168,173). These studies show that a minimum increase in $\dot{V}O_{2max}$ of 15% is generally attained in programs that meet the above stated guidelines. Although changes in $\dot{V}O_{2max}$ greater than 30% have been shown, they are usually associated with large total body mass and FW loss, in cardiac patients, or in persons with a very low initial level of fitness. Also, as a result of leg fatigue or a lack of motivation, persons with low initial fitness may have spuriously low initial $\dot{V}O_{2max}$ values. Klissouras (94A) and Bouchard (16A) have shown that human variation in the trainability of $\dot{V}O_{2max}$ is important and related to current phenotype level. That is, there is a genetically determined pretraining status of the trait and capacity to adapt to physical training. Thus, physiological results should be interpreted with respect to both genetic variation and the quality and quantity of training performed.

Intensity-duration. Intensity and duration of training are interrelated, with total amount of work accomplished being an important factor in improvement in fitness (12,20,27,48,90,92,123,127,128,136,149,151,164). Although more comprehensive inquiry is necessary, present evidence suggests that, when exercise is performed above the minimum intensity threshold, the total amount of work accomplished is an important factor in fitness development (19,27,126,127,149,151) and maintenance (134). That is, improvement will be similar for activities performed at a lower intensity-

longer duration compared to higher intensity-shorter duration if the total energy costs of the activities are equal. Higher intensity exercise is associated with greater cardiovascular risk (156A), orthopedic injury (124,139) and lower compliance to training than lower intensity exercise (36,105,124,146). Therefore, programs emphasizing low to moderate intensity training with longer duration are recommended for most adults.

The minimal training intensity threshold for improvement in $\dot{V}O_{2max}$ is approximately 60% of the HR_{max} (50% of $\dot{V}O_{2max}$ or HR_{max} reserve) (80,85). The 50% of HR_{max} reserve represents a heart rate of approximately 130–135 beats·min^{-1} for young persons. As a result of the age-related change in maximum heart rate, the absolute heart rate to achieve this threshold is inversely related to age and can be as low as 105–115 beats·min^{-1} for older persons (35,65,150). Patients who are taking beta-adrenergic blocking drugs may have significantly lower heart rate values (171). Initial level of fitness is another important consideration in prescribing exercise (26,90,104,148,151). The person with a low fitness level can achieve a significant training effect with a sustained training heart rate as low as 40–50% of HR_{max} reserve, while persons with higher fitness levels require a higher training stimulus (35,58,152,164).

Classification of exercise intensity. The classification of exercise intensity and its standardization for exercise prescription based on a 20–60 min training session has been confusing, misinterpreted, and often taken out of context. The most quoted exercise classification system is based on the energy expenditure (kcal·min^{-1}·kg^{-1}) of industrial tasks (40,89). The original data for this classification system were published by Christensen (24) in 1953 and were based on the energy expenditure of working in the steel mill for an 8-h day. The classification of industrial and leisure-time tasks by using absolute values of energy expenditure have been valuable for use in the occupational and nutritional setting. Although this classification system has broad application in medicine and, in particular, making recommendations for weight control and job placement, it has little or no meaning for preventive and rehabilitation exercise training programs. To extrapolate absolute values of energy expenditure for completing an industrial task based on an 8-h work day to 20–60 min regimens of exercise training does not make sense. For example, walking and jogging/running can be accomplished at a wide range of speeds; thus, the relative intensity becomes important under these conditions. Because the endurance training regimens recommended by ACSM for nonathletic adults are geared for 60 min or less of physical activity, the system of classification of exercise training intensity shown in Table 1 is recommended (139). The use of a realistic time period for training and an individual's relative exercise intensity makes this system amenable to young, middle-aged, and elderly participants, as well as patients with a limited exercise capacity (3,137,139).

TABLE 1. Classification of intensity of exercise based on 20–60 min of endurance training.

Relative Intensity (%)		Rating of Perceived Exertion	Classification of Intensity
HR_{max}*	$\dot{V}O_{2max}$* or HR_{max} reserve		
<35%	<30%	<10	Very light
35–59%	30–49%	10–11	Light
60–79%	50–74%	12–13	Moderate (somewhat hard)
80–89%	75–84%	14–16	Heavy
≥90%	≥85%	>16	Very heavy

Table from Pollock, M. L. and J. H. Wilmore. *Exercise in Health and Disease: Evaluation and Prescription for Prevention and Rehabilitation*, 2nd Ed. Philadelphia: W.B. Saunders, 1990. Published with permission.
* HR_{max} = maximum heart rate; $\dot{V}O_{2max}$ = maximum oxygen uptake.

Table 1 also describes the relationship between relative intensity based on percent HR_{max}, percentage of HR_{max} reserve or percentage of $\dot{V}O_{2max}$, and the rating of perceived exertion (RPE) (15,16,137). The use of heart rate as an estimate of intensity of training is the common standard (3,139).

The use of RPE has become a valid tool in the monitoring of intensity in exercise training programs (11,37,137,139). It is generally considered an adjunct to heart rate in monitoring relative exercise intensity, but once the relationship between heart rate and RPE is known, RPE can be used in place of heart rate (23,139). This would not be the case in certain patient populations where a more precise knowledge of heart rate may be critical to the safety of the program.

Frequency. The amount of improvement in $\dot{V}O_{2max}$ tends to plateau when frequency of training is increased above 3 d·wk^{-1} (50,123,139). The value of the added improvement found with training more than 5 d·wk^{-1} is small to not apparent in regard to improvement in $\dot{V}O_{2max}$ (75–77,106,123). Training of less than 2 d·wk^{-1} does not generally show a meaningful change in $\dot{V}O_{2max}$ (29,50,118,123,152,164).

Mode. If frequency, intensity, and duration of training are similar (total kcal expenditure), the training adaptations appear to be independent of the mode of aerobic activity (101A,118,130). Therefore, a variety of endurance activities, e.g., those listed above, may be used to derive the same training effect.

Endurance activities that require running and jumping are considered high impact types of activity and generally cause significantly more debilitating injuries to beginning as well as long-term exercisers than do low impact and non-weight bearing type activities (13,93, 117,124,127,135,140,142). This is particularly evident in the elderly (139). Beginning joggers have increased foot, leg, and knee injuries when training is performed more than 3 d·wk^{-1} and longer than 30 min duration per exercise session (135). High intensity interval training (run-walk) compared to continuous jogging training

was also associated with a higher incidence of injury (124,136). Thus, caution should be taken when recommending the type of activity and exercise prescription for the beginning exerciser. Orthopedic injuries as related to overuse increase linearly in runners/joggers when performing these activities (13,140). Thus, there is a need for more inquiry into the effect that different types of activities and the quantity and quality of training has on injuries over short-term and long-term participation.

An activity such as weight training should not be considered as a means of training for developing $\dot{V}O_{2max}$, but it has significant value for increasing muscular strength and endurance and FFW (32,54,107, 110,165). Studies evaluating circuit weight training (weight training conducted almost continuously with moderate weights, using 10–15 repetitions per exercise session with 15–30 s rest between bouts of activity) show an average improvement in $\dot{V}O_{2max}$ of 6% (1,51–54,83,94,108,170). Thus, circuit weight training is not recommended as the only activity used in exercise programs for developing $\dot{V}O_{2max}$.

Age. Age in itself does not appear to be a deterrent to endurance training. Although some earlier studies showed a lower training effect with middle-aged or elderly participants (9,34,79,157,168), more recent studies show the relative change in $\dot{V}O_{2max}$ to be similar to younger age groups (7,8,65,132,150,161,163). Although more investigation is necessary concerning the rate of improvement in $\dot{V}O_{2max}$ with training at various ages, at present it appears that elderly participants need longer periods of time to adapt (34,132,150). Earlier studies showing moderate to no improvement in $\dot{V}O_{2max}$ were conducted over a short time span (9), or exercise was conducted at a moderate to low intensity (34), thus making the interpretation of the results difficult.

Although $\dot{V}O_{2max}$ decreases with age and total body mass and FW increase with age, evidence suggests that this trend can be altered with endurance training (22,27,86–88,139). A 9% reduction in $\dot{V}O_{2max}$ per decade for sedentary adults after age 25 has been shown (31,73), but for active individuals the reduction may be less than 5% per decade (21,31,39,73). Ten or more yr follow-up studies where participants continued training at a similar level showed maintenance of cardiorespiratory fitness (4,87,88,138). A cross-sectional study of older competitive runners showed progressively lower values in $\dot{V}O_{2max}$ from the fourth to seventh decades of life, but also showed less training in the older groups (129). More recent 10-yr follow-up data on these same athletes (50–82 yr of age) showed $\dot{V}O_{2max}$ to be unchanged when training quantity and quality remained unchanged (138). Thus, lifestyle plays a significant role in the maintenance of fitness. More inquiry into the relationship of long-term training (quantity and quality), for both competitors and noncompetitors, and physiological function with increasing age is necessary before more definitive statements can be made.

Maintenance of training effect. In order to maintain the training effect, exercise must be continued on a regular basis (18,25,28,47,97,111,144,147). A significant reduction in cardiorespiratory fitness occurs after 2 wk of detraining (25,144), with participants returning to near pretraining levels of fitness after 10 wk (47) to 8 months of detraining (97). A loss of 50% of their initial improvement in $\dot{V}O_{2max}$ has been shown after 4–12 wk of detraining (47,91,144). Those individuals who have undergone years of continuous training maintain some benefits for longer periods of detraining than subjects from short-term training studies (25). While stopping training shows dramatic reductions in $\dot{V}O_{2max}$, reduced training shows modest to no reductions for periods of 5–15 wk (18,75–77,144). Hickson et al., in a series of experiments where frequency (75), duration (76), or intensity (77) of training were manipulated, found that, if intensity of training remained unchanged, $\dot{V}O_{2max}$ was maintained for up to 15 wk when frequency and duration of training were reduced by as much as ⅔. When frequency and duration of training remained constant and intensity of training was reduced by ⅓ or ⅔, $\dot{V}O_{2max}$ was significantly reduced. Similar findings were found in regards to reduced strength training exercise. When strength training exercise was reduced from 3 or 2 $d \cdot wk^{-1}$ to at least 1 $d \cdot wk^{-1}$, strength was maintained for 12 wk of reduced training (62). Thus, it appears that missing an exercise session periodically or reducing training for up to 15 wk will not adversely effect $\dot{V}O_{2max}$ or muscular strength and endurance as long as training intensity is maintained.

Even though many new studies have given added insight into the proper amount of exercise, investigation is necessary to evaluate the rate of increase and decrease of fitness when varying training loads and reduction in training in relation to level of fitness, age, and length of time in training. Also, more information is needed to better identify the minimal level of exercise necessary to maintain fitness.

Weight control and body composition. Although there is variability in human response to body composition change with exercise, total body mass and FW are generally reduced with endurance training programs (133,139,171A), while FFW remains constant (123,133,139,169) or increases slightly (116,174). For example, Wilmore (171A) reported the results of 32 studies that met the criteria for developing cardiorespiratory fitness that are outlined in this position stand and found an average loss in total body mass of 1.5 kg and percent fat of 2.2%. Weight loss programs using dietary manipulation that result in a more dramatic decrease in total body mass show reductions in both FW and FFW (2,78,174). When these programs are

conducted in conjunction with exercise training, FFW loss is more modest than in programs using diet alone (78,121). Programs that are conducted at least 3 d·wk^{-1} (123,125,126,128,169), of at least 20 min duration (109,123,169), and of sufficient intensity to expend approximately 300 kcal per exercise session (75 kg person)[2] are suggested as a threshold level for total body mass and FW loss (27,64,77,123,133,139). An expenditure of 200 kcal per session has also been shown to be useful in weight reduction if the exercise frequency is at least 4 d·wk^{-1} (155). If the primary purpose of the training program is for weight loss, then regimens of greater frequency and duration of training and low to moderate intensity are recommended (2,139). Programs with less participation generally show little or no change in body composition (44,57,93,123,133,159, 162,169). Significant increases in $\dot{V}O_{2max}$ have been shown with 10–15 min of high intensity training (6,79,109,118,123,152,153); thus, if total body mass and FW reduction are not considerations, then shorter duration, higher intensity programs may be recommended for healthy individuals at low risk for cardiovascular disease and orthopedic injury.

Exercise Prescription for Muscular Strength and Endurance

The addition of resistance/strength training to the position statement results from the need for a well-rounded program that exercises all the major muscle groups of the body. Thus, the inclusion of resistance training in adult fitness programs should be effective in the development and maintenance of FFW. The effect of exercise training is specific to the area of the body being trained (5,43,145A,172). For example, training the legs will have little or no effect on the arms, shoulders, and trunk muscles. A 10-yr follow-up of master runners who continued their training regimen, but did no upper body exercise, showed maintenance of $\dot{V}O_{2max}$ and a 2-kg reduction in FFW (138). Their leg circumference remained unchanged, but arm circumference was significantly lower. These data indicate a loss of muscle mass in the untrained areas. Three of the athletes who practiced weight training exercise for the upper body and trunk muscles maintained their FFW. A comprehensive review by Sale (145A) carefully documents available information on specificity of training.

Specificity of training was further addressed by Graves et al. (63). Using a bilateral knee extension exercise, they trained four groups: group A, first ½ of the range of motion; group B, second ½ of the range of motion; group AB, full range of motion; and a control group that did not train. The results clearly showed that the training result was specific to the range of motion trained, with group AB getting the best full range effect. Thus, resistance training should be performed through a full range of motion for maximum benefit (63,95).

Muscular strength and endurance are developed by the overload principle, i.e., by increasing more than normal the resistance to movement or frequency and duration of activity (32,41,43,74,145). Muscular strength is best developed by using heavy weights (that require maximum or nearly maximum tension development) with few repetitions, and muscular endurance is best developed by using lighter weights with a greater number of repetitions (10,41,43,145). To some extent, both muscular strength and endurance are developed under each condition, but each system favors a more specific type of development (43,145). Thus, to elicit improvement in both muscular strength and endurance, most experts recommend 8–12 repetitions per bout of exercise.

Any magnitude of overload will result in strength development, but higher intensity effort at or near maximal effort will give a significantly greater effect (43,74,101B,103,145,172). The intensity of resistance training can be manipulated by varying the weight load, repetitions, rest interval between exercises, and number of sets completed (43). Caution is advised for training that emphasizes lengthening (eccentric) contractions, compared to shortening (concentric) or isometric contractions, as the potential for skeletal muscle soreness and injury is accentuated (3A,84A).

Muscular strength and endurance can be developed by means of static (isometric) or dynamic (isotonic or isokinetic) exercises. Although each type of training has its favorable and weak points, for healthy adults, dynamic resistance exercises are recommended. Resistance training for the average participant should be rhythmical, performed at a moderate to slow speed, move through a full range of motion, and not impede normal forced breathing. Heavy resistance exercise can cause a dramatic acute increase in both systolic and diastolic blood pressure (100A,101C).

The expected improvement in strength from resistance training is difficult to assess because increases in strength are affected by the participants' initial level of strength and their potential for improvement (43,66,74,114,172). For example, Mueller and Rohmert (114) found increases in strength ranging from 2 to 9% per week depending on initial strength levels. Although the literature reflects a wide range of improvement in strength with resistance training programs, the average improvement for sedentary young and middle-aged men and women for up to 6 months of training is 25–30%. Fleck and Kraemer (43), in a review of 13 studies representing various forms of isotonic training, showed an average improvement in bench press strength of 23.3% when subjects were tested on the

[2] Haskell and Haskell et al. (71,72) have suggested the use of 4 kcal·kg^{-1} of body weight of energy expenditure per day for a minimum standard for use in exercise programs.

equipment with which they were trained and 16.5% when tested on special isotonic or isokinetic ergometers (six studies). Fleck and Kraemer (43) also reported an average increase in leg strength of 26.6% when subjects were tested with the equipment that they trained on (six studies) and 21.2% when tested with special isotonic or isokinetic ergometers (five studies). Results of improvement in strength resulting from isometric training have been of the same magnitude as found with isotonic training (17,43,62,63).

In light of the information reported above, the following guidelines for resistance training are recommended for the average healthy adult. A minimum of 8–10 exercises involving the major muscle groups should be performed a minimum of two times per week. A minimum of one set of 8–12 repetitions to near fatigue should be completed. These minimal standards for resistance training are based on two factors. First, the time it takes to complete a comprehensive, well-rounded exercise program is important. Programs lasting more than 60 min per session are associated with higher dropout rates (124). Second, although greater frequencies of training (17,43,56) and additional sets or combinations of sets and repetitions elicit larger strength gains (10,32,43,74,145,172), the magnitude of difference is usually small. For example, Braith et al. (17) compared training 2 $d \cdot wk^{-1}$ with 3 $d \cdot wk^{-1}$ for 18 wk. The subjects performed one set of 7–10 repetitions to fatigue. The 2 $d \cdot wk^{-1}$ group showed a 21% increase in strength compared to 28% in the 3 $d \cdot wk^{-1}$ group. In other words, 75% of what could be attained in a 3 $d \cdot wk^{-1}$ program was attained in 2 $d \cdot wk^{-1}$. Also, the 21% improvement in strength found by the 2 $d \cdot wk^{-1}$ regimen is 70–80% of the improvement reported by other programs using additional frequencies of training and combinations of sets and repetitions (43). Graves et al. (62,63), Gettman et al. (55), Hurley et al. (83) and Braith et al. (17) found that programs using one set to fatigue showed a greater than 25% increase in strength. Although resistance training equipment may provide a better graduated and quantitative stimulus for overload than traditional calisthenic exercises, calisthenics and other resistance types of exercise can still be effective in improving and maintaining strength.

SUMMARY

The combination of frequency, intensity, and duration of chronic exercise has been found to be effective for producing a training effect. The interaction of these factors provide the overload stimulus. In general, the lower the stimulus the lower the training effect, and the greater the stimulus the greater the effect. As a result of specificity of training and the need for maintaining muscular strength and endurance, and flexibility of the major muscle groups, a well-rounded training program including resistance training and flexibility exercises is recommended. Although age in itself is not a limiting factor to exercise training, a more gradual approach in applying the prescription at older ages seems prudent. It has also been shown that endurance training of fewer than 2 $d \cdot wk^{-1}$, at less than 50% of maximum oxygen uptake and for less than 10 $min \cdot d^{-1}$, is inadequate for developing and maintaining fitness for healthy adults.

In the interpretation of this position statement, it must be recognized that the recommendations should be used in the context of participants' needs, goals, and initial abilities. In this regard, a sliding scale as to the amount of time allotted and intensity of effort should be carefully gauged for both the cardiorespiratory and muscular strength and endurance components of the program. An appropriate warm-up and cool-down, which would include flexibility exercises, is also recommended. The important factor is to design a program for the individual to provide the proper amount of physical activity to attain maximal benefit at the lowest risk. Emphasis should be placed on factors that result in permanent lifestyle change and encourage a lifetime of physical activity.

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APPENDIX D

LIFETIME FITNESS ACTIVITIES

Lifetime Fitness Activities

aerobic dance
aerobic walking
bicycling
cross-country skiing
dance (vigorous)
hiking
jogging/running
mountain climbing
orienteering
rope jumping
rowing
soccer
swimming

APPENDIX E

ENVIRONMENTAL CONDITIONS AND PRECAUTIONS

Environmental Conditions and Precautions

Environmental conditions are important when considering exercise performance and the general well-being of the exercising individual. It is important to be aware of significant environmental conditions which should be considered in the modification of physical activity. Because excessive heat and/or humidity are particularly dangerous, the following guidelines have been provided (Reference: Inbar,O. "Exercise in the Heat." In: Welsh, R., and Shephard, R. *Current Therapy in Sports Medicine*, C.V. Mosby, St Louis, Mo, 1985).

Dry Heat (Air Temperature). When an individual exercises in a hot and dry environment, cooling of the skin is brought about predominately by evaporation of sweat. The air can absorb a considerable amount of moisture before becoming saturated. However, since heat dissipation depends upon elimination of water in perspiration, large amounts of fluid are taken out of the body, and dehydration is a distinct possibility.

Wet Heat (Humidity). When the air surrounding an individual is not only hot but also loaded with moisture, evaporative cooling is impaired. An environment in which the ambient (dry bulb) temperature is only moderately high (32° C) but relative humidity is high (85%), is considerably more stressful to both circulatory and thermoregulatory systems than an environment with a higher dry temperature (say 40°C), but a relative humidity as low as 25%.

The following are some general guidelines for safe exercise in hot environments. It is necessary to determine the Wet Bulb Globe Temperature (WBGT) Index, which requires both dry and wet bulb temperatures.

The guidelines for Wet Bulb Globe Temperature are as follows:

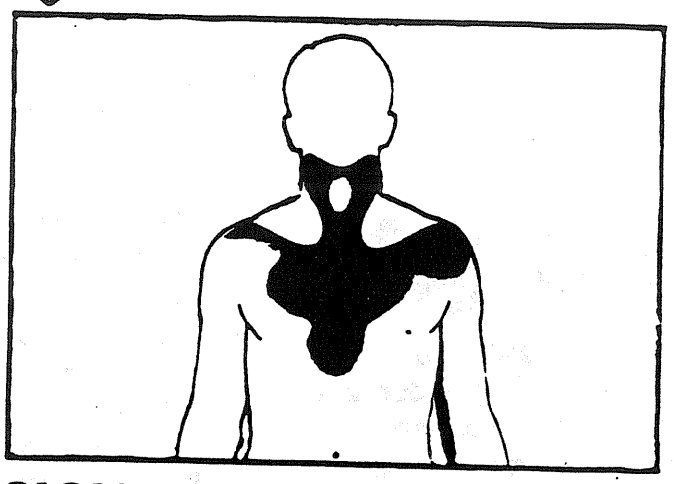
Above 26.5° C (79° F) - utilize discretion
Above 29.5° C (82° F) - avoid strenuous activity
Above 31.0° C (84° F) - stop physical activity

APPENDIX F

EMERGENCY AND ROUTINE FIRST-AID PROCEDURES

CPR in Basic Life Support For Cardiac Arrest

American Heart Association



SIGNALS

The most common signal of a heart attack is:

- uncomfortable pressure, squeezing, fullness or pain in the center of the chest behind the breastbone.

Other signals may be:

- sweating
- nausea
- shortness of breath, or
- a feeling of weakness

Sometimes these signals subside and return.

ACTIONS for SURVIVAL

- Recognize the "signals".
- Stop activity and sit or lie down.
- If signals persist 2 minutes or longer, call the emergency number, or if not available, go to the nearest hospital emergency room which provides emergency cardiac care.

There are many causes of sudden death: poisoning, drowning, suffocation, choking, electrocution and smoke inhalation. But the most common cause is heart attack. Everyone should know the usual early signals of heart attack and have an emergency plan of action.

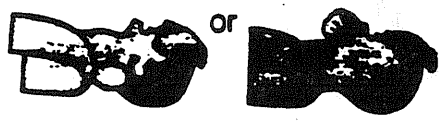
American Heart Association

National Center • 7320 Greenville Avenue • Dallas, Texas 7523[illegible]

70-023-E
80-2MM

Basic CPR is a simple procedure, as simple as A-B-C, Airway, Breathing and Circulation.

Airway



If you find a collapsed person, determine if the victim is conscious by shaking the shoulder and shouting "Are you all right?" If no response, shout for help. If victim is not lying flat on his back, roll victim over, moving the entire body at one time as a total unit. Then open the airway.

To open the victim's airway, lift up the neck or chin gently with one hand while pushing down on the forehead with the other to tilt head back. Once the airway is open, place your ear close to the victim's mouth:

Look — at the chest and stomach for movement.
Listen — for sounds of breathing.
Feel — for breath on your cheek.

If none of these signs is present, victim is not breathing.

If opening the airway does not cause the victim to begin to breathe spontaneously, you must provide rescue breathing.

Breathing

The best way to provide rescue breathing is by using the mouth-to-mouth technique. Take your hand that is on the victim's forehead and turn it so that you can pinch the victim's nose shut while keeping the heel of the hand in place to maintain head tilt. Your other hand should remain under the victim's neck or chin, lifting up.

Immediately give four quick, full breaths in rapid succession using the mouth-to-mouth method.

Check Pulse

After giving the four quick breaths, locate the victim's carotid pulse to see if the heart is beating. To find the carotid artery, take your hand that is under the victim's neck, or supporting the chin, and locate the voice box. Slide the tips of your index and middle fingers into the groove beside the voice box. Feel for the pulse. Cardiac arrest can be recognized by absent breathing and an absent pulse in the carotid artery in the neck.

If you cannot find the pulse, you must provide artificial circulation in addition to rescue breathing.

Activate The Emergency Medical Services System (EMSS). Send someone to call 911 or your local emergency number.

External Chest Compression

Artificial circulation is provided by external chest compression. In effect, when you apply rhythmic pressure on the lower half of the victim's breastbone, you are forcing his heart to pump blood. To perform external chest compression properly, kneel at the victim's side near his chest. Locate the notch at the lowest portion of the sternum. Place the heel of one hand on the sternum next to the fingers that located the notch. Place your other hand on top of the one that is in position. Be sure to keep your fingers off the chest wall. You may find it easier to do this if you interlock your fingers.

Bring your shoulders directly over the victim's sternum as you compress downward, keeping your arms straight. Depress the sternum about 1½ to 2 inches for an adult victim. Then relax pressure on the sternum completely. However, do not remove your hands from the victim's sternum, but do allow the chest to return

to its normal position between compressions. Relaxation and compression should be of equal duration.

If you are the only rescuer, you must provide both rescue breathing and external chest compression. The proper ratio is 15 chest compressions to 2 quick breaths. You must compress at the rate of 80 times per minute when you are working alone since you will stop compressions when you take time to breathe.

When there is another rescuer to help you, position yourselves on opposite sides of the victim if possible. One of you should be responsible for interposing a breath during the relaxation after each fifth compression. The other rescuer, who compresses the chest, should use a rate of 60 compressions per minute.

RESCUERS	RATIO OF COMPRESSIONS TO BREATHS	RATE OF COMPRESSIONS
ONE	15:2	80 times/min.
TWO	5:1	60 times/min.

For Infants (Birth to 1 year) and Children (1 year to 8 years)

Basic life support for infants and children is similar to that for adults. A few important differences to remember are given below.

Airway

Be careful when handling an infant that you do not exaggerate the backward position of the head tilt. An infant's neck is so pliable that forceful backward tilting might block breathing passages instead of opening them.

Breathing

Don't try to pinch off the nose. Cover both the mouth and nose of an infant who is not breathing. Use small breaths with less volume to inflate the lungs. Give one small breath every

three seconds. If the victim is a child, cover the mouth and breathe every four seconds.

Check Pulse

In an infant, the absence of a pulse may be more easily determined by feeling on the inside of the upper arm midway between the elbow and the shoulder. The pulse check in the child is the same as the adult.

Circulation

The technique for external chest compression is different for infants and small children. In both cases, only one hand is used for compression. The other hand may be slipped under the infant to provide a firm support for his back.

For infants, use only the **tips** of the index and middle fingers to compress the chest at mid-sternum. Depress the sternum between ½ to 1 inch at a rate of 100 times a minute.

For children, use only the **heel** of one hand to compress the chest. Depress the sternum between 1 and 1½ inches, depending upon the size of the child. The rate should be 80 times per minute.

In the case of both infants and children, breaths should be administered during the relaxation after every fifth chest compression.

	Part of Hand	Hand Position	Depress Sternum	Rate of Compression
INFANTS	tips of index and middle fingers	mid-sternum	½ to 1 inch	100 per minute.
CHILDREN	heel of hand	mid-sternum	1 to 1½ inches	80 per minute

Neck Injury

If you suspect the victim has suffered a neck injury, you must not open the airway in the usual manner. If the victim is injured in a diving or automobile accident, you should consider the possibility of such a neck injury. In these cases, the airway should be opened by using a modified jaw thrust, keeping the victim's head in a fixed, neutral position.

Other conditions which may cause unconsciousness and airway obstruction include: stroke, epilepsy, head injury, alcoholic intoxication, drug overdose, diabetes.

REMEMBER

1. Is the victim unconscious?
2. If so, shout for help, open the airway, and check for breathing.
3. If no breathing, give 4 quick breaths.
4. Check carotid pulse.
5. Activate the EMSS: Send someone to call "911" or your local emergency number.
6. If no pulse, begin external chest compression by depressing lower half of the sternum 1½ to 2 inches.
7. Continue uninterrupted CPR until advanced life support is available.

CPR for ONE RESCUER: 15:2 compressions to breaths at a rate of 80 compressions a minute (4 cycles per minute)

CPR for TWO RESCUERS: 5:1 compressions to breaths at a rate of 60 compressions a minute

Periodic practice in CPR is essential to insure a satisfactory level of proficiency. A life may depend upon how well you have remembered the proper steps of CPR and how to apply them. You should be sure to have tested both your skill and knowledge of CPR at least once a year. It could mean someone's life.

Emergency Medical Service Telephone Numbers:

Home: _____

Work: _____

Emergency Medical Services System (EMSS)

Any victim on whom you begin resuscitation must be considered to need advanced life support. He or she will have the best chance of surviving if your community has a total emergency medical services system. This includes an efficient communications alert system, such as 911, with public awareness of how or where to call; well trained rescue personnel who can respond rapidly; vehicles that are properly equipped; an emergency facility that is open 24 hours a day to provide advanced life support; and an intensive care section in the hospital for the victims. You should work with all interested agencies to achieve such a system.

Choking

The urgency of choking, its prevention and first aid steps for infants, children and adults cannot be over-emphasized. For more information contact your Heart Association.

For a Healthier Heart

- Have your blood pressure checked regularly.
- Don't smoke cigarettes.
- Eat foods low in saturated (animal) fats and cholesterol.
- Maintain proper weight.
- Exercise regularly.
- Have regular medical check-ups.

Prepared by the Committee on Emergency Cardiac Care.

A GUIDE TO THE PREVENTION & TREATMENT OF INJURIES

UNITED STATES YOUTH SOCCER ASSOCIATION

Youth Division of the U.S. Soccer Federation

FIRST AID SUPPLIES

Absorbent cotton
Adhesive tape 1", 1-1/2"
Alcohol – to cleanse and dry the skin
Ammonia Capsules
Analgesic balm
Aspirin
Arm Sling
Band-aids 3/4", 1", 3" x 2" sterile elastic band-aids (elastoplast)
B.F.I. Powder
Butterfly Closures – for cuts
Elastic bandage 2", 3", 4"
Gauze bandage – 1", 2" roll
Kwik Kold ice pack
Mercurochrome or Iodine – Antiseptic
Neosporin Antibiotic ointment
Sponge rubber 1/2" for pressure and protective padding
Sterile gauze pads 2", 3" x 3", 4" x 4"
Tincture of Benzoin spray – skin toughener
Vaseline
5-1/2" bandage scissors
5-1/2" sharp blunt scissors
5-1/2" tweezers

These items may be purchased through Drug Stores, Hospital Supply Houses, Sporting Goods Stores.

WHEN IN DOUBT... ALWAYS CONSULT A PHYSICIAN.

ROUTINE FIRST AID PROCEDURE

TYPE OF INJURY	IMMEDIATE TREATMENT	CONVALESCENT TREATMENT	EXPECTED PERIOD OF CONVALESCENCE
Lacerations, Abrasions	1. Mechanical cleansing with soap, water and brush or gauze 2. Irrigation with ample sterile water or saline solution 3. Antiseptic – Mercurochrome or Iodine 4. Proper suturing (steri strip or butterfly until attended by physician) 5. Dry sterile dressing with compression dressing bandage	Daily dressings. Removal of sutures at appropriate time	Expect healing in 6-7 days. Period of disability 0-2 days (depending on size and location)
Puncture Wounds	1. Mechanical cleansing 2. Antiseptic 3. Do not suture 4. Dry sterile dressing with compression bandage 5. Possible need for a Tetanus shot	Daily dressings. Expect serum reaction 5-8 days from Tetanus shot given by Physician	Expect healing in 8-14 days. Period of disability depends on location of wound and presence of serum reaction
Eye Wounds **a) Blow**	1. Cleanse area. Wash debris away from eye 2. Irrigate with eye cup & water 3. Apply cold packs to eye area	Eye Patch	
b) Foreign Bodies	1. Elevate lids. Inspect gently 2. Wash eye with water 3. If not immediately relieved see a Physician		
c) Scratched Eyeball	1. Relieve with water 2. Refer to doctor immediately		
Blisters **a) Closed**	1. Spray with tincture of benzoin 2. Apply sterile pressure pad	Daily dressings until healed. Protection of area with pad and lubricant	Very few days Period of disability 0
b) Open	1. Carefully debride area 2. Swab with antiseptic or neosporin Ointment 3. Dry Sterile dressing 4. Tincture of benzoin to toughen skin		
Nose **a) Bleed**	1. Pressure with cold compress to stop bleeding 2. Pinch nostrils 3. Instruct athlete not to blow nose		Very few days. Period of disability 0-2 days
b) Break	1. Control hemorrhage as above 2. Care of physician and X-rays	Tape. Mask protector	
Scrotum	1. Gently roll athlete on his back 2. Bend knees or elevate legs 3. Gently rub abdominal muscles 4. Loosen belt DON'T lift athlete and drop on his hinder. A testicle which has already been driven into the pelvis may complicate the problem.	Continue ice packs for 12 hours if tissues contused **Care in Privacy** 1. Cold packs (no ice) 2. Perineol wrap	Very few days depending on severity

WHEN IN DOUBT... ALWAYS CONSULT A PHYSICIAN.

TYPE OF INJURY	IMMEDIATE TREATMENT	CONVALESCENT TREATMENT	EXPECTED PERIOD OF CONVALESCENCE
Fractured Jaw	1. Immobilize jaw with a four-tailed bandage 2. Hospitalize and X-ray	Dental guard. See a dentist immediately	Expect healing in 21 days
Loose Teeth	1. Do not remove. Straighten if necessary. Immediate care of a dentist 2. If tooth knocked from socket and no damage to tooth, replace if possible.		Period of disability 0
Throat Contusion	1. Application of ice to area 2. Immediate consultation of physician to check air passages		Very few days depending on severity
Concussion	1. Responsibility is medical	Infirmary or hospital treatment until symptom free 48 hours	If symptoms of headache, dizziness, blurred vision, vomiting continue over 48 hours, individual should not be permitted to compete for 21 days or longer, if at all. There is definitely a condition described as "punch drunk" and often recurrent concussion cases in football and boxing demonstrate this.
Contusions	1. Application of cold for 1/2 hr. before swelling starts 2. Elevation 3. Well padded compression bandage (sponge rubber) 4. Rest of injured part for 24-48 hours (crutches)	Ice up to 48 hours. Daily heat and massage until function of muscle or joint returns to normal. Protection of injured part by padding or strapping after individual returns to play.	Depends on the severity or degree of tissue damage. Disability period expected from a few days up to 3 weeks.
Sprains	1. Application for 1/2 hr. of cold before swelling starts 2. Elevation 3. Well padded compression bandage (sponge rubber) 4. Rest of injured joint for 24-48 hrs. (crutches).	Ice up to 48 hours. Daily heat and massage until function of muscle or joint returns to normal. Protection of injured part by padding or strapping after individual returns to play.	Depends on the severity or degree of tissue damage. Period of disability 2-21 days. Depends on location of injury. Longer period in lower extremity.
Dislocation of Joints and Fractures of Bones	1. These injuries are the responsibility of a physician. 2. First aid measures should be aimed at the application of cold at site of injury and complete immobilization of joints above and below site of fracture or dislocation, until placed under the care of a doctor	In dislocation without fractures, complete immobilization is a mistake. In fractures, complete immobilization over too long a period of time is a mistake. Care of the skin under apparatus or equipment used for immobilization should be emphasized. In 48 hours heat and massage can be started in dislocations. In fractures, check-up X-rays should be taken every 2-3 weeks. Massage should be gentle. Excessive or forced active motion treatment should be forbidden	In simple dislocations and fractures return to normal function is essential before any individual can be permitted to play. Dislocation and fractures of the upper extremity require from 3-8 weeks to heal or return to normal function. Dislocations and fractures of the lower extremity require a longer period of convalescence. The injured bone or joint should be safeguarded by padding, strapping, etc. when the individual returns to play

CARE AND PREVENTION OF ATHLETIC INJURIES

GENERAL RULES TO BE FOLLOWED WHEN EXAMINING AN INJURED ATHLETE

1. Remain calm and radiate self-confidence while examining the injured athlete.
2. "A" – AIRWAY – Make sure athlete's airway is open, i.e., he hasn't swallowed his tongue.
3. "B" – BREATHING – Is the athlete breathing adequately, with ease, or difficulty?
4. "C" – CIRCULATION – Check pulse.
5. Observe whether the athlete is conscious or not.
6. Observe position of athlete's head, neck, trunk, limbs etc., as well as surrounding factors that may have a bearing on the injury.
7. A player should **never** be moved until it has definitely been ascertained that there are no back, neck or head injuries.
8. Be thorough in your examination.
9. Watch play at all times in order to determine the causes of any injury which may occur.
10. **DANGER AREAS:** To avoid complications, certain injuries require specific procedures:
    a) The athlete with a head injury should be referred to a doctor.
    b) Do not move an athlete with a neck or back injury without a doctor's approval.
    c) When in doubt about the seriousness of an injury consult a doctor.
    d) Do not attempt the definitive procedures of physicians to repair dislocations, fractures, etc.

RECOMMENDED TRAINER'S KIT

TREATMENT OF INJURIES

1. **Butterfly closures** can effectively hold a cut closed until the player receives medical attention. Control bleeding first by applying direct pressure with a cloth or gauze material (a clean, dry towel is most effective). Clean the cut of any dirt, sweat, etc. Close the skin together such that the walls of the cut are just touching, and dab any further bleeding dry. Finally, apply the butterfly closures with the first one over the middle of the cut, and then work to the sides.
2. **Band-aids, sterile gauze, telfa pads:** Sterile gauze pads are good for cleaning cuts and abrasions while the telfa pads are excellent as non-stick dressings.
3. **Elastic or tensor bandages:** (6" and 3" size) (Sold at sporting goods stores and drug stores). These, used in conjunction with ice packs, are excellent in preventing and reducing swelling caused by muscle and ligament bruises, strains, sprains, and pulls. Ice and tensor should be applied immediately after any of these injuries no matter how minor they might appear. **Remember PIE (pressure, ice and elevation).**
4. **Plastic bags:** The type used by supermarkets for produce are the best type to use for ice packs. Stay away from the commercial type ice packs and surface coolant sprays.
5. **Liquid antiseptic and disinfectant:** There are commercially made products available at drugstores. A mixture of water and soap is a good substitute, or even just clean clear water to wash off cuts and abrasions.
6. **Vaseline:** (drugstores) Effective as a lubricant on areas affected by rubbing of straps, equipment, etc. Also good to protect chaffed areas, scrapes and abrasions.
7. **Adhesive tape:** This item can be economically purchased by the case through sporting goods stores that cater to teams. White 1-1/2".
8. **Tufskin:** (Used as a taping base) Benzoin spray or liquid.
9. **Q-Tips and wooden tongue depressors:** For cleaning and maintenance of airway in unconscious victims.
10. **Aspirin:** (Check for team or school regulations regarding the taking and administration of these.)
11. **Antibiotic ointment:** (drugstores) Neosporin Ointment.
12. **Athletic Liniment:** (Sporting goods stores and drugstores) Stay away from liquid liniments. In athletics, you are better off using the grease-type liniments.
13. **Safety or tape scissors:** (Drugstores)
14. **Moleskin, felt, sponge:** These items are excellent to make "donut" pads for protection of blisters and bruises. Moleskin (Dr. Scholl's is sold at drugstores) is good for lining boots and shoes that have rough linings which can cause skin blisters and cuts.

Note: As some of the above items are sold in quantities that might exceed your needs, cooperative buying and sharing is recommended in order to keep costs at a minimum. Be careful not to buy in too large quantities or the goods will go to waste and your costs will go up.

Each sport has its particular injuries and thus needs more of one item than the other (e.g. hockey has a lot of cuts and so would be apt to use more butterfly closures. Football has more ankle sprains and thus would use more adhesive tape in order to support the sprains by taping).

THIS PAMPHLET IS A GUIDELINE ...WHEN IN DOUBT ... ALWAYS CONSULT A PHYSICIAN

The table distinguishes between these immediate and delayed symptoms. The first three symptoms described are cause for consulting a physician before carrying out the next exercise session. If you cannot consult a physician, discontinue your exercise program. Symptoms 4 and 5 have suggested remedies which may be tried prior to consulting a physician. The other symptoms listed may usually be remedied without medical advice by the measures described. However, if the suggested measures fail to work, of course medical evaluation is indicated. (An illustration summarizing the warnings listed in this table can be found on page 26, Fig. 8.)

Warnings and What to do About Them

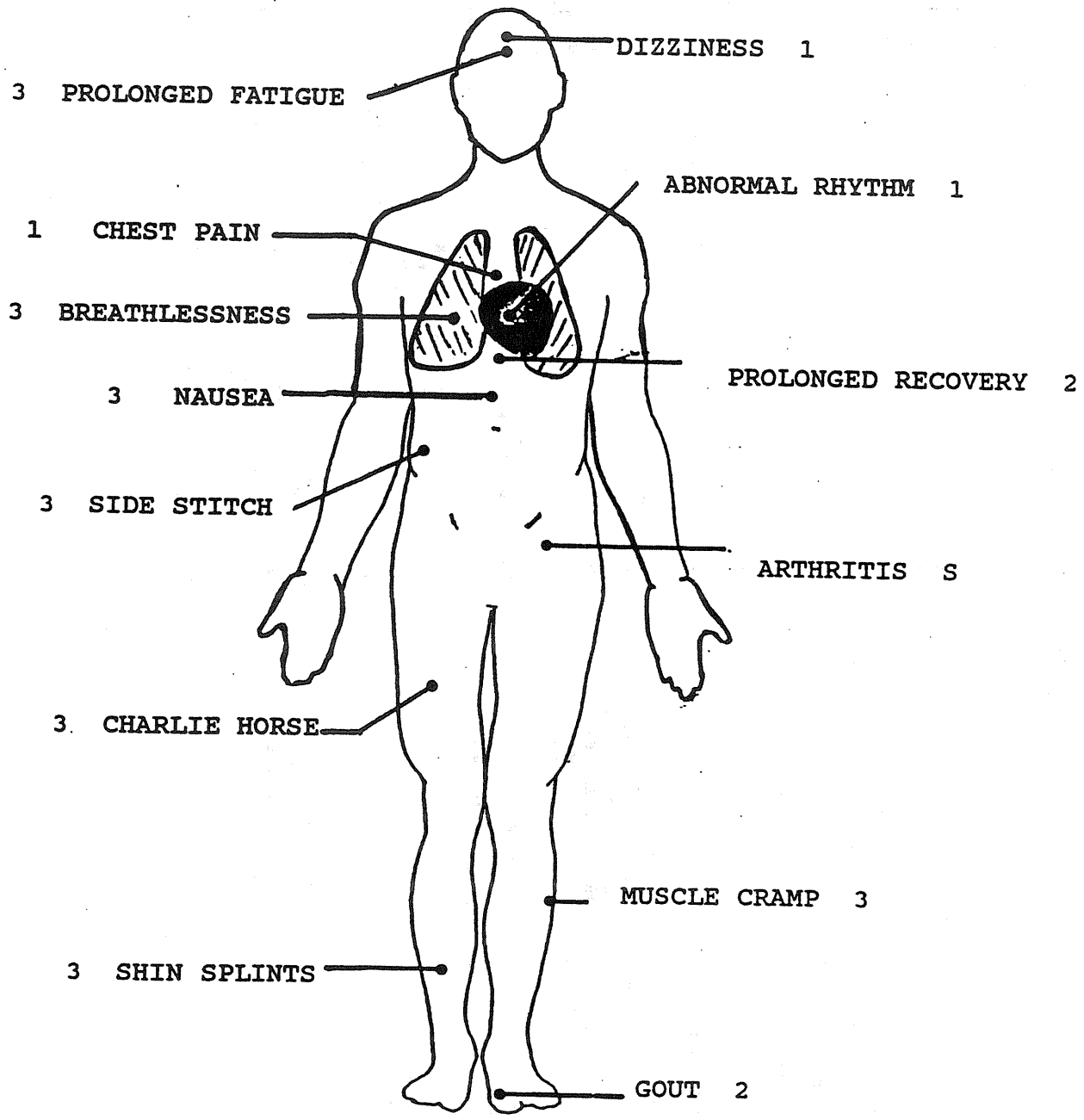
STOP — SEE A PHYSICIAN BEFORE RESUMING

REMEDIES WHICH MAY BE SELF-ADMINISTERED

CAN BE REMEDIED WITHOUT MEDICAL CONSULTATION

SYMPTOM	CAUSE	REMEDY
1 Abnormal heart action; e.g. —pulse becoming irregular —fluttering, jumping or palpitations in chest or throat —sudden burst of rapid heartbeats —sudden very slow pulse when a moment before it had been on target. (Immediate or delayed)	Extrasystoles (extra heart beats), dropped heartbeats, or disorders of cardiac rhythm. This may or may not be dangerous and should be checked out by physician.	Consult physician before resuming exercise program. He may provide medication to temporarily eliminate the problem and allow you to safely resume your exercise program, or you may have a completely harmless kind of cardiac rhythm disorder.
2 Pain or pressure in the center of the chest or the arm or throat precipitated by exercise or following exercise. (Immediate or delayed)	Possible heart pain.	Consult physician before resuming exercise program.
3 Dizziness, lightheadedness, sudden incoordination, confusion, cold sweat, glassy stare, pallor, blueness or fainting. (Immediate)	Insufficient blood to the brain.	Do not try to cool down. Stop exercise and lie down with feet elevated, or put head down between legs until symptoms pass. Later consult physician before next exercise session.
4 Persistent rapid heart action near the target level even 5-10 minutes after the exercise was stopped. (Immediate)	Exercise is probably too vigorous.	Keep heart rate at lower end of target zone or below. Increase the vigor of exercise more slowly. If these measures do not control the excessively high recovery heart rate, consult physician.
5 Flare up of arthritic condition or gout which usually occurs in hips, knees, ankles, or big toe (weight bearing joints). (Immediate or delayed)	Trauma to joints which are particularly vulnerable.	If you are familiar with how to quiet these flare-ups of your old joint condition, use your usual remedies. Rest up and do not resume your exercise program until the condition subsides. Then resume the exercise at a lower level with protective footwear on softer surfaces, or select other exercises which will put less strain on the impaired joints; e.g. swimming will be better for people with arthritis of the hips since it can be done mostly with the arms. If this is new arthritis, or if there is no response to usual remedies, see physician.
6 Nausea or vomiting after exercise. (Immediate)	Not enough oxygen to the intestine. You are either exercising too vigorously or cooling down too quickly.	Exercise less vigorously and be sure to take a more gradual and longer cool-down.
7 Extreme breathlessness lasting more than 10 minutes after stopping exercise. (Immediate)	Exercise is too taxing to your cardiovascular system or lungs.	Stay at the lower end of your target range. If symptoms persist, do even less than target level. Be sure that while you are exercising you are not too breathless to talk to a companion.
8 Prolonged fatigue even 24 hours later. (Delayed)	Exercise is too vigorous.	Stay at lower end of target range or below. Increase level more gradually.
9 Shin splints (pain on the front or sides of lower leg). (Delayed)	Inflammation of the fascia connecting the leg bones, or muscle tears where muscles of the lower leg connect to the bones.	Use shoes with thicker soles. Work out on turf which is easier on your legs.
10 Insomnia which was not present prior to the exercise program. (Delayed)	Exercise is too vigorous.	Stay at lower end of target range or below. Increase intensity of exercise gradually.
11 Pain in the calf muscles which occurs on heavy exercise but not at rest. (Immediate)	May be due to muscle cramps due to lack of use of these muscles, or exercising on hard surfaces. May also be due to poor circulation to the legs (called claudication).	Use shoes with thicker soles, cool down adequately. Muscle cramps should clear up after a few sessions. If "muscle cramps" do not subside, circulation is probably faulty. Try another type of exercise; e.g., bicycling instead of jogging in order to use different muscles.
12 Side stitch (sticking under the ribs while exercising). (Immediate)	Diaphragm spasm. The diaphragm is the large muscle which separates the chest from the abdomen.	Lean forward while sitting, attempting to push the abdominal organs up against the diaphragm.
13 Charley horse or muscle-bound feeling. (Immediate or delayed)	Muscles are deconditioned and unaccustomed to exercise.	Take hot bath and usual headache remedy. Next exercise should be less strenuous.

WARNINGS



1 - SEE YOUR PHYSICIAN OR DISCONTINUE EXERCISE PROGRAM
2 - TRY SUGGESTED REMEDY BRIEFLY; SEE PHYSICIAN
3 - YOU CAN PROBABLY HANDLE IT YOURSELF

APPENDIX G

NOTICE OF PHYSICAL CONDITIONING PROGRAM MODIFICATION

NOTICE OF PHYSICAL CONDITIONING PROGRAM MODIFICATION

(Note: All proposed changes to the **Minimum Program Requirements** Must be approved in advance by POST)

Academy: _____ Date: _____

Prepared by: _____ Phone: (___) _____

Academy Director: _____ Date: _____

The Basic Academy Physical Conditioning Program will be modified in our academy as follows: [Explain any proposed change(s) to the Minimum Program Requirements and/or any specific exercise activity(ies) being replaced and describe substitute(s)]:

_____

_____

_____

_____

_____

_____

_____

Reason(s) for changes: _____

_____

_____

_____

_____

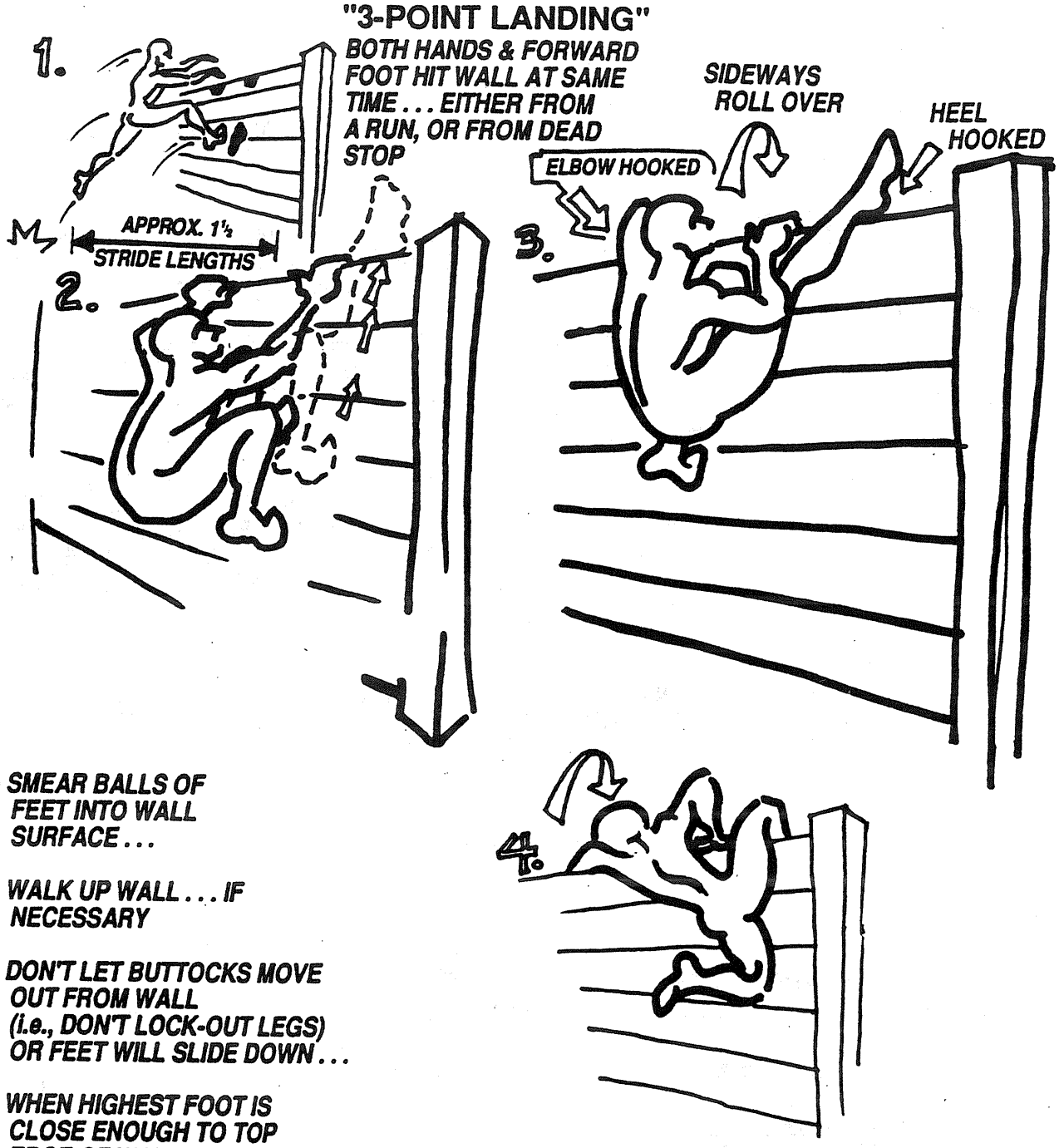
SUBMIT TO: Commission on Peace Officer Standards and Training
1601 Alhambra Blvd.
Sacramento, CA 95816-7083

Attention: Ken Krueger
Standards and Evaluation Services

APPENDIX H

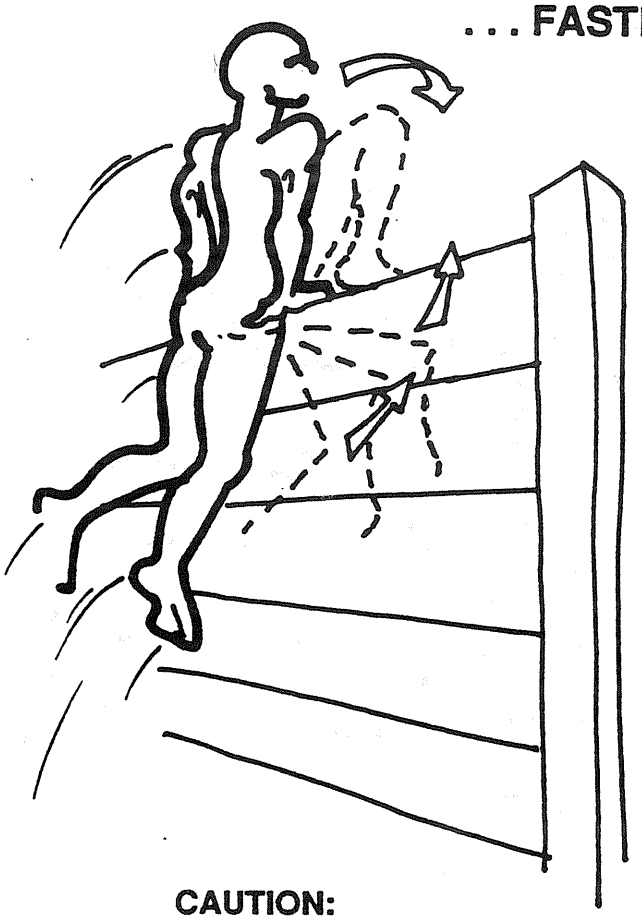
WALL/FENCE CLIMBING TECHNIQUES

WALL/FENCE CLIMBING TECHNIQUES



- *SMEAR BALLS OF FEET INTO WALL SURFACE . . .*
- *WALK UP WALL . . . IF NECESSARY*
- *DON'T LET BUTTOCKS MOVE OUT FROM WALL (i.e., DON'T LOCK-OUT LEGS) OR FEET WILL SLIDE DOWN . . .*
- *WHEN HIGHEST FOOT IS CLOSE ENOUGH TO TOP EDGE OF WALL, HOOK HEEL OVER . . . (WITH PRACTICE, MOST CADETS WILL NOT HAVE TO WALK UP WALL AFTER A FEW WEEKS; MERELY PLANT FORWARD FOOT & HOOK THE REAR FOOT OVER THE EDGE) . . .*
- *KEEP TOES POINTED UPWARD (TOWARD SKY) SO THAT LARGER HAMSTRING MUSCLES ARE USED TO PULL; WHEN FOOT TURNS TO SIDE, SMALLER ADDUCTOR MUSCLES BECOME PRIMARY MOVER AND GROIN PULLS OFTEN OCCUR*
- *HOOK ELBOW/ARMPIT OF OPPOSITE SIDE OF BODY OVER TOP EDGE OF WALL & ROLL OVER, MAINTAINING LOW PROFILE, SCAN LANDING AREA BEFORE JUMPING*

. . . FASTER METHOD . . .



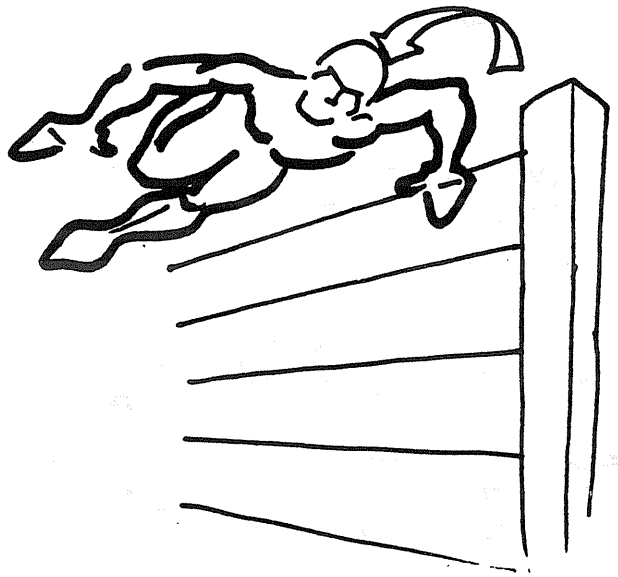
- *BOTH HANDS HIT TOP EDGE OF WALL AT SAME TIME BUT FEET DO NOT CONTACT SIDE OF WALL . . .*
- *INSTEAD, CADET VAULTS/PRESSES UP TO THE TOP OF THE WALL USING HIS/HER MOMENTUM AND UPPER BODY STRENGTH . . .*
- *UNTIL HIS/HER ARMS ARE IN A FULL LOCKED POSITION SUPPORTING ENTIRE BODY WEIGHT . . . PELVIS IS AT TOP EDGE OF WALL LEGS DANGLING . . .*
- *FROM THIS POSITION, THE CADET'S DOMINANT FOOT IS BROUGHT UP TO THE TOP EDGE OF THE WALL . . . THE OPPOSITE FOOT/LEG IS THEN BROUGHT UP ALONGSIDE IT AND THE CADET MERELY JUMPS DOWN ON THE OPPOSITE SIDE . . .*

CAUTION:

THESE TECHNIQUES ARE FASTER THAN THE 3-POINT/HEEL HOOKING TECHNIQUE, BUT, TACTICALLY, THE CADET IS A LARGER TARGET AND THE RISK OF CATCHING THEIR FOOT AND FALLING IS GREATER . . .

. . . FASTEST METHOD . . .

- *SAME AS ABOVE EXCEPT CADET'S FEET **NEVER** TOUCH THE WALL . . .*
- *HE/SHE MERELY CLEARS BOTH LEGS OVER THE EDGE AS SOON AS HANDS GRASP THE WALL, USING FORWARD MOMENTUM*



APPENDIX I

WORK SAMPLE TEST SCORE CONVERSION TABLES

SOLID FENCE CLIMB

Time	Points	Time	Points	Time	Points	Time	Points	Time	Points	Time	Points
4.0	224	7.0	181	10.0	138	13.0	96	16.0	53	19.0	10
4.1	223	7.1	180	10.1	137	13.1	94	16.1	51	19.1	8
4.2	221	7.2	178	10.2	136	13.2	93	16.2	50	19.2	7
4.3	220	7.3	177	10.3	134	13.3	91	16.3	48	19.3	6
4.4	218	7.4	176	10.4	133	13.4	90	16.4	47	19.4	4
4.5	217	7.5	174	10.5	131	13.5	88	16.5	46	19.5	3
4.6	216	7.6	173	10.6	130	13.6	87	16.6	44	19.6	1
4.7	214	7.7	171	10.7	128	13.7	86	16.7	43		
4.8	213	7.8	170	10.8	127	13.8	84	16.8	41		
4.9	211	7.9	168	10.9	126	13.9	83	16.9	40		
5.0	210	8.0	167	11.0	124	14.0	81	17.0	38		
5.1	208	8.1	166	11.1	123	14.1	80	17.1	37		
5.2	207	8.2	164	11.2	121	14.2	78	17.2	36		
5.3	206	8.3	163	11.3	120	14.3	77	17.3	34		
5.4	204	8.4	161	11.4	118	14.4	76	17.4	33		
5.5	203	8.5	160	11.5	117	14.5	74	17.5	31		
5.6	201	8.6	158	11.6	116	14.6	73	17.6	30		
5.7	200	8.7	157	11.7	114	14.7	71	17.7	28		
5.8	198	8.8	156	11.8	113	14.8	70	17.8	27		
5.8	197	8.9	154	11.9	111	14.9	68	17.9	26		
6.0	196	9.0	153	12.0	110	15.0	67	18.0	24		
6.1	194	9.1	151	12.1	108	15.1	66	18.1	23		
6.2	193	9.2	150	12.2	107	15.2	64	18.2	21		
6.3	191	9.3	148	12.3	106	15.3	63	18.3	20		
6.4	190	9.4	147	12.4	104	15.4	61	18.4	18		
6.5	188	9.5	146	12.5	103	15.5	60	18.5	17		
6.6	187	9.6	144	12.6	101	15.6	58	18.6	16		
6.7	186	9.7	143	12.7	100	15.7	57	18.7	14		
6.8	184	9.8	141	12.8	98	15.8	56	18.8	13		
6.9	183	9.9	140	12.9	97	15.9	54	18.9	11		

99 Yard Obstacle Course Conversion Table

Time	Points	Time	Points	Time	Points	Time	Points	Time	Points
14.0	248	17.9	198	21.8	149	25.7	100	29.6	50
14.1	246	18.0	197	21.9	148	25.8	98	29.7	49
14.2	245	18.1	195	22.0	146	25.9	97	29.8	48
14.3	244	18.2	194	22.1	145	26.0	96	29.9	47
14.4	242	18.3	193	22.2	144	26.1	95	30.0	45
14.5	241	18.4	192	22.3	142	26.2	93	30.1	44
14.6	239	18.5	190	22.4	141	26.3	92	30.2	43
14.7	238	18.6	189	22.5	140	26.4	91	30.3	42
14.8	237	18.7	188	22.6	139	26.5	90	30.4	40
14.9	236	18.8	187	22.7	137	26.6	88	30.5	39
15.0	235	18.9	185	22.8	136	26.7	87	30.6	38
15.1	233	19.0	184	22.9	135	26.8	86	30.7	37
15.2	232	19.1	183	23.0	134	26.9	85	30.8	35
15.3	231	19.2	182	23.1	132	27.0	83	30.9	34
15.4	229	19.3	180	23.2	131	27.1	82	31.0	33
15.5	228	19.4	179	23.3	130	27.2	81	31.1	32
15.6	227	19.5	178	23.4	129	27.3	79	31.2	30
15.7	226	19.6	176	23.5	127	27.4	78	31.3	29
15.8	224	19.7	175	23.6	126	27.5	77	31.4	28
15.9	223	19.8	174	23.7	125	27.6	76	31.5	27
16.0	222	19.9	173	23.8	124	27.7	74	31.6	25
16.1	221	20.0	172	23.9	122	27.8	73	31.7	24
16.2	219	20.1	170	24.0	121	27.9	72	31.8	23
16.3	218	20.2	169	24.1	120	28.0	71	31.9	22
16.4	217	20.3	168	24.2	119	28.1	69	32.0	20
16.5	216	20.4	166	24.3	117	28.2	68	32.1	19
16.6	214	20.5	165	24.4	116	28.3	67	32.2	18
16.7	213	20.6	164	24.5	115	28.4	66	32.3	16
16.8	212	20.7	163	24.6	113	28.5	64	32.4	15
16.9	211	20.8	161	24.7	112	28.6	63	32.5	14
17.0	210	20.9	160	24.8	111	28.7	62	32.6	13
17.1	208	21.0	159	24.9	110	28.8	61	32.7	11
17.2	207	21.1	158	25.0	109	28.9	59	32.8	10
17.3	205	21.2	156	25.1	107	29.0	58	32.9	09
17.4	204	21.3	155	25.2	106	29.1	57	33.0	07
17.5	203	21.4	154	25.3	105	29.2	56	33.1	06
17.6	202	21.5	153	25.4	103	29.3	54	33.2	05
17.7	200	21.6	151	25.5	102	29.4	53	33.3	04
17.8	199	21.7	150	25.6	101	29.5	52	33.4	03
								33.5	01

Body Drag Conversion Table

Tm.	Pts.	Tm.	Pts.	Tm.	Pts.	Tm.	Pts.	Tm.	Pts.	Tm.	Pts.	Tm.	Pts.
2.7	61	6.6	52	10.5	42	14.4	33	18.3	24	22.2	14	26.1	05
2.8	61	6.7	51	10.6	42	14.5	33	18.4	23	22.3	14	26.2	05
2.9	60	6.8	51	10.7	42	14.6	32	18.5	23	22.4	14	26.3	04
3.0	60	6.9	51	10.8	42	14.7	32	18.6	23	22.5	14	26.4	04
3.1	60	7.0	51	10.9	41	14.8	32	18.7	23	22.6	13	26.5	04
3.2	60	7.1	50	11.0	41	14.9	32	18.8	22	22.7	13	26.6	04
3.3	59	7.2	50	11.1	41	15.0	31	18.9	22	22.8	13	26.7	04
3.4	59	7.3	50	11.2	41	15.1	31	19.0	22	22.9	13	26.8	03
3.5	59	7.4	50	11.3	40	15.2	31	19.1	22	23.0	12	26.9	03
3.6	59	7.5	49	11.4	40	15.3	31	19.2	21	23.1	12	27.0	03
3.7	58	7.6	49	11.5	40	15.4	31	19.3	21	23.2	12	27.1	03
3.8	58	7.7	49	11.6	40	15.5	30	19.4	21	23.3	12	27.2	02
3.9	58	7.8	49	11.7	39	15.6	30	19.5	21	23.4	11	27.3	02
4.0	58	7.9	48	11.8	39	15.7	30	19.6	20	23.5	11	27.4	02
4.1	58	8.0	48	11.9	39	15.8	30	19.7	20	23.6	11	27.5	02
4.2	57	8.1	48	12.0	39	15.9	29	19.8	20	23.7	11	27.6	01
4.3	57	8.2	48	12.1	38	16.0	29	19.9	20	23.8	10	27.7	01
4.4	57	8.3	47	12.2	38	16.1	29	20.0	20	23.9	10	27.8	01
4.5	57	8.4	47	12.3	38	16.2	29	20.1	19	24.0	10	27.9	01
4.6	56	8.5	47	12.4	38	16.3	28	20.2	19	24.1	10		
4.7	56	8.6	47	12.5	37	16.4	28	20.3	19	24.2	09		
4.8	56	8.7	47	12.6	37	16.5	28	20.4	19	24.3	09		
4.9	56	8.8	46	12.7	37	16.6	28	20.5	18	24.4	09		
5.0	55	8.9	46	12.8	37	16.7	27	20.6	18	24.5	09		
5.1	55	9.0	46	12.9	36	16.8	27	20.7	18	24.6	09		
5.2	55	9.1	46	13.0	36	16.9	27	20.8	18	24.7	08		
5.3	55	9.2	45	13.1	36	17.0	27	20.9	17	24.8	08		
5.4	54	9.3	45	13.2	36	17.1	26	21.0	17	24.9	08		
5.5	54	9.4	45	13.3	36	17.2	26	21.1	17	25.0	08		
5.6	54	9.5	45	13.4	35	17.3	26	21.2	17	25.1	07		
5.7	54	9.6	44	13.5	35	17.4	26	21.3	16	25.2	07		
5.8	53	9.7	44	13.6	35	17.5	25	21.4	16	25.3	07		
5.9	53	9.8	44	13.7	35	17.6	25	21.5	16	25.4	07		
6.0	53	9.9	44	13.8	34	17.7	25	21.6	16	25.5	06		
6.1	53	10.0	43	13.9	34	17.8	25	21.7	15	25.6	06		
6.2	53	10.1	43	14.0	34	17.9	25	21.8	15	25.7	06		
6.3	52	10.2	43	14.1	34	18.0	24	21.9	15	25.8	06		
6.4	52	10.3	43	14.2	33	18.1	24	22.0	15	25.9	05		
6.5	52	10.4	42	14.3	33	18.2	24	22.1	15	26.0	05		

Chain Link Fence Climb Conversion Table

Time	Points	Time	Points	Time	Points
4.0	120	7.9	78	11.8	36
4.1	119	8.0	77	11.9	35
4.2	118	8.1	76	12.0	34
4.3	117	8.2	75	12.1	33
4.4	116	8.3	74	12.2	32
4.5	115	8.4	73	12.3	31
4.6	114	8.5	72	12.4	30
4.7	113	8.6	71	12.5	29
4.8	112	8.7	70	12.6	28
4.9	111	8.8	69	12.7	27
5.0	109	8.9	68	12.8	26
5.1	108	9.0	66	12.9	25
5.2	107	9.1	65	13.0	23
5.3	106	9.2	64	13.1	22
5.4	105	9.3	63	13.2	21
5.5	104	9.4	62	13.3	20
5.6	103	9.5	61	13.4	19
5.7	102	9.6	60	13.5	18
5.8	101	9.7	59	13.6	17
5.9	100	9.8	58	13.7	16
6.0	99	9.9	57	13.8	15
6.1	98	10.0	56	13.9	14
6.2	97	10.1	55	14.0	13
6.3	96	10.2	54	14.1	12
6.4	94	10.3	52	14.2	11
6.5	93	10.4	51	14.3	10
6.6	92	10.5	50	14.4	08
6.7	91	10.6	49	14.5	07
6.8	90	10.7	48	14.6	06
6.9	89	10.8	47	14.7	05
7.0	88	10.9	46	14.8	04
7.1	87	11.0	45	14.9	03
7.2	86	11.1	44	15.0	02
7.3	85	11.2	43	15.1	01
7.4	84	11.3	42		
7.5	83	11.4	41		
7.6	82	11.5	40		
7.7	80	11.6	39		
7.8	79	11.7	37		

500 Yard Run Conversion Table

Time	Points	Time	Points	Time	Points	Time	Points
53.0 to 55.9	50	91.1 to 94.0	37	129.4 to 132.2	24	167.6 to 170.5	11
56.0 to 58.7	49	94.1 to 97.0	36	132.3 to 135.2	23	170.6 to 173.4	10
58.8 to 61.7	48	97.1 to 99.9	35	135.3 to 138.1	22	173.5 to 176.4	09
61.8 to 64.6	47	100.0 to 102.8	34	138.2 to 141.1	21	176.5 to 179.3	08
64.7 to 67.6	46	102.9 to 105.8	33	141.2 to 144.0	20	179.4 to 182.2	07
67.7 to 70.5	45	105.9 to 108.7	32	144.1 to 147.0	19	182.3 to 185.2	06
70.6 to 73.5	44	108.8 to 111.7	31	147.1 to 149.9	18	185.3 to 188.1	05
73.6 to 76.4	43	111.8 to 114.6	30	150.0 to 152.8	17	188.2 to 191.1	04
76.5 to 79.3	42	114.7 to 117.6	29	152.9 to 155.8	16	191.2 to 194.0	03
79.4 to 82.3	41	117.7 to 120.5	28	155.9 to 158.7	15	194.1 to 196.9	02
82.4 to 85.2	40	120.6 to 123.4	27	158.8 to 161.7	14	197.0 to 199.9	01
85.3 to 88.2	39	123.5 to 126.3	26	161.8 to 164.6	13		
88.3 to 91.0	38	126.4 to 129.3	25	164.7 to 167.5	12		

APPENDIX J

RECOMMENDED MEDICAL PRESCREENING PROCEDURES

Dear Academy Student:

As part of your basic training you will be required to participate in the Basic Academy Physical Conditioning Program and to demonstrate acceptable physical readiness by successfully completing a job-related physical ability test at the conclusion of the physical conditioning program.

The purpose of this letter is to describe the Basic Academy Physical Conditioning Program and advise you that you must obtain appropriate medical clearance before you participate in the program.

Participation in the Basic Academy Physical Conditioning Program and the successful completion of job-related tests are requirements of the California Commission on Peace Officer Standards and Training (POST). POST is the state agency that has responsibility for certifying all basic training academies in California.

The POST Basic Academy Physical Conditioning Program is designed to develop in you and all students an enhanced level of physical fitness, in a manner that will both prepare you to perform physically demanding police tasks and instill a desire to maintain a high level of fitness throughout your career. To this end, the objectives of the program are to:

- Prepare you to meet minimum physical job task performance standards
- Sensitize and educate you to the importance of maintaining a lifelong health-related personal physical fitness program
- Provide positive reinforcement and support for maintaining high fitness levels and personal health-related physical fitness programs

These objectives are achieved by means of a three-fold educational process. First, you will be introduced to the goals and objectives of the physical program which includes individual assessment and instruction on the principles of physical conditioning. Second, you will participate in a series of conditioning sessions which systematically embrace a wide variety of physical exercise. These activities include neuro-musculo-skeletal development through strength and flexibility exercises, as well as cardiorespiratory enhancement through various aerobic-type involvements. The progression of exercise will be dictated by your "entry-fitness level" and the subsequent improvement of your physical condition through training. Third, you will receive classroom instruction on the subjects of: Physical fitness as a lifetime pursuit, low back care, nutrition, overweight/obesity, substance abuse, stress management, and self-evaluation.

The actual physical conditioning phase of the program is organized into 60-minute sessions. In most instances, the program will consist of three 60-minute sessions per week. In some academies, however, the sessions will be presented daily. Each is designed to address muscular strength, muscular endurance, cardiovascular endurance, and flexibility. The relative emphasis given to each of these types of conditioning varies from session to session. All exercises within an exercise session are designed to maximize the development of those physical abilities needed to function as a patrol officer. A detailed physiological analysis was conducted by physiologists to identify/develop the specific exercises within each session. The analysis was conducted on actual patrol officer physical job task information that was collected from officers in over 100 police and sheriffs' departments statewide. Thus, great care was taken to ensure that the content of the conditioning program is highly job-related.

It is by design that the focus of the POST Basic Academy Physical Conditioning Program is to provide physical conditioning that is not punitive or mentally stressful, but rather educates and sensitizes students to the need for a lifestyle of daily physical activity.

Shoes

Prior to entering the academy, you are encouraged to purchase a good pair of running shoes. The type and proper fit of shoes is important for any activity program. Programs

such as this which involve a lot of running and jogging require special shoes which have been designed specifically for these activities. These shoes should not fit tightly; and they should have good support at the arch and heel. Ripple, crepe, or waffle soles are excellent for use on hard surfaces. It is important to remember that good shoes and socks are the best prevention against blisters, soreness, and aching of feet, ankles, and knees.

Overview of Final Tests

As indicated, at the conclusion of the conditioning program you must successfully complete a battery of job-related tests in order to graduate from the academy. The test battery that you will take will probably consist of a series of Work Samples that must be performed within a specified time. Examples of the kinds of Work Sample tests that you will likely take include climbing over a 6-foot solid wall and/or chain link fence; dragging a lifelike mannequin (165-lbs.) for a specified distance (about 30 feet); running a short pursuit obstacle course (about 100 yards long) consisting of several sharp turns and minor obstacles that must be jumped or vaulted; and running a long pursuit, usually about 500 yards, with no obstacles. These types of tests are designed to simulate actual job tasks that are frequently performed by the typical California peace officer. The passing scores required on such tests have been established so that they reflect standards that are reasonable and consistent with normal expectations of acceptable proficiency. Therefore, they are not tests of athletic prowess but rather tests that measure one's ability to do the job.

Medical Clearance

Prior to participating in the program it is necessary for you to get a medical clearance from your physician. The medical clearance is required to provide reasonable assurance that there is no medical reason why you should not participate in the program, and must be obtained at your own expense.

Enclosed are two forms for you to fill out prior to visiting your physician. One is a Health History Statement and the other is a cardiac risk assessment ("PAR-Q"). Bring these completed forms with you the day you visit your doctor.

Enclosed you will also find an envelope marked "For your Physician." Give this envelope along with the completed Medical History and "PAR-Q" forms to your doctor (or his representative) when you go in for your visit.

In closing, the intent of this letter was to provide you with a brief description of the nature and purpose of the conditioning program you will be experiencing. For further details about any of the information provided, you are encouraged to contact the physical training staff at the academy.

Thank you for your attention and good luck in your pursuit of a law enforcement career.

Sincerely,

BASIC ACADEMY COORDINATOR

Enclosure

Dear Physician:

The individual you are examining has been requested to obtain a Medical Clearance to participate in the Physical Conditioning Program at the _____ _____ Academy. The Physical Conditioning Program consists of certain physical performance tests and a program of vigorous physical conditioning. Physical conditioning occurs a minimum of 1 hour per day, 3 days per week, for at least 12 weeks. Listed below are descriptions of both the physical performance tests, and the content of the physical conditioning program.

A Medical History Statement and a cardiac risk assessment (PAR-Q) have been completed by the individual to assist you in making your determination of the individual's suitability for participation in the conditioning program. Included you will find a copy of the guidelines suggested by the American College of Sports Medicine for the evaluation of persons who are beginning an exercise program.

PHYSICAL PERFORMANCE TESTS

1.5 Mile Run: The individual runs 1.5 miles as fast as possible. Measures cardiorespiratory endurance.

Abdominal Curls (in 1 minute): The individual performs as many abdominal curls as possible in 1 minute. Measures dynamic muscular endurance of the trunk.

Sit and Reach Test: The individual performs a test that measures range of motion of the lower back and abdominal girth.

500 Yard Run: The individual runs 500 yards in as little time as possible. Simulates a police work task.

Fence Climb: The individual runs 5 yards, climbs a wood and/or chain link fence, and then continues running 25 yards in the least amount of time possible. Simulates a police work task.

Push-ups: The individual performs as many push-ups as possible. Measures arm strength/endurance.

Body Drag Test: The individual partially lifts and drags a 165-lb. lifelike dummy 32 feet as quickly as possible. Simulates a police work task.

PHYSICAL CONDITIONING

The program of physical conditioning involves exercise focusing on cardiorespiratory endurance (aerobics), strength, power, speed and flexibility. The intensity of the various exercises is individualized to the extent possible and is gradually increased throughout the course of the conditioning program. Each exercise session lasts 60 minutes and consists of an 8 minute warm-up period, a 30-45 minute conditioning bout focusing on a primary training objective, and a 7 minute cool-down period. A description of the conditioning objectives and activities appear below.

OVERVIEW OF CONDITIONING ACTIVITIES

Conditioning Objective	Formats	Type of Activities
Flexibility	Walk/Jog Floor Calisthenics	Begins with walk/jog to warm muscles and is followed by slow stretching exercises for major muscle groups and joints
Muscular Strength/Cardiovascular Endurance	Circuit Training with Weights	A combination of conventional Universal Gym training exercises and jogging in place for a specified period of time.
Muscular Strength/Cardiovascular Endurance	Circuit Training with Calisthenics	A combination of conventional calisthenics and jogging and sprinting for a specified period of time requiring a specific number of repetitions.
Cardiovascular Endurance	Continuous Running	Conventional jog-run for distance and pace (15-45 minute duration).

Please complete the attached "Medical Clearance" form following your examination.

Thank you.

MEDICAL CLEARANCE TO PARTICIPATE IN THE PHYSICAL CONDITIONING PROGRAM FOR:

_____
(Print name of individual)

Having reviewed the above-named individual's Medical History Statement and cardiac risk assessment (PAR-Q), and having read the descriptions provided of the physical performance tests and the physical conditioning activities, and having personally examined the above-named individual, it is my professional opinion that:

Check (✔) one:

_____ It is highly unlikely that participation in the Physical Conditioning Program will pose a significant medical risk to the above-named individual.

_____ The above-named individual should <u>not</u> participate in the Physical Conditioning Program.

_____ _____
Physician's Signature Date

PHYSICAL ACTIVITY READINESS QUESTIONNAIRE (PAR-Q)*
A Self-administered Questionnaire for Adults

PAR Q & YOU

PAR-Q is designed to help you help yourself. Many health benefits are associated with regular exercise, and the completion of PAR-Q is a sensible first step to take if you are planning to increase the amount of physical activity in your life.

For most people physical activity should not pose any problem or hazard. PAR-Q has been designed to identify the small number of adults for whom physical activity might be inappropriate or those who should have medical advice concerning the type of activity most suitable for them.

Common sense is your best guide in answering these few questions. Please read them carefully and check the ☑ YES or NO opposite the question if it applies to you.

YES	NO	
☐	☐	1. Has your doctor ever said you have heart trouble?
☐	☐	2. Do you frequently have pains in your heart and chest?
☐	☐	3. Do you often feel faint or have spells of severe dizziness?
☐	☐	4. Has a doctor ever said your blood pressure was too high?
☐	☐	5. Has your doctor ever told you that you have a bone or joint problem such as arthritis that has been aggravated by exercise, or might be made worse with exercise?
☐	☐	6. Is there a good physical reason not mentioned here why you should not follow an activity program even if you wanted to?
☐	☐	7. Are you over age 65 and not accustomed to vigorous exercise?

If You Answered

YES to one or more questions

If you have not recently done so, consult with your personal physician by telephone or in person BEFORE increasing your physical activity and/or taking a fitness test. Tell him what questions you answered YES on PAR-Q, or show him your copy.

programs

After medical evaluation, seek advice from your physician as to your suitability for:

- unrestricted physical activity, probably on a gradually increasing basis.
- restricted or supervised activity to meet your specific needs, at least on an initial basis. Check in your community for special programs or services.

NO to all questions

If you answered PAR-Q accurately, you have reasonable assurance of your present suitability for:

- A GRADUATED EXERCISE PROGRAM - A gradual increase in proper exercise promotes good fitness development while minimizing or eliminating discomfort.
- AN EXERCISE TEST - Simple tests of fitness (such as the Canadian Home Fitness Test) or more complex types may be undertaken if you so desire.

postpone

If you have a temporary minor illness, such as a common cold.

Reference: PAR-Q Validation Report, British Columbia Ministry of Health, May, 1978.

* Produced by the British Columbia Ministry of Health and the Department of National Health & Welfare.

PAR$_X$

PHYSICAL ACTIVITY ʼRESCRIPTIONS*

PAR$_X$ is a checklist of medical conditions requiring that a degree of precaution and/or special advice be considered for adults undertaking physical activities. Three categories are provided, and conditions are grouped by system or otherwise as appropriate. Comments under Special Prescriptive Conditions/Advice are general, since details and alternatives require clinical judgment in each individual instance.

[illegible]

PHYSICAL ACTIVITY RECOMMENDATIONS

Provided as a physician checklist or patient handout

SPECIAL PRESCRIPTIVE CONDITIONS/ ADVICE		System
• Individualized prescriptive advice generally appropriate • limitations imposed and/or • special exercises prescribed • May require medical following and/or initial medical supervision in exercise program.		Comments
☐ aortic (or pulmonic) stenosis – mild angina pectoris and other manifestations of coronary insufficiency (e.g. post-acute infarct) ☐ cyanotic heart disease ☐ shunts (intermittent or fixed) ☐ conduction disturbances • complete AV block • left BBB • Wolff-Parkinson-White syndrome ☐ dysrhythmias – controlled ☐ fixed rate pacemakers	• clinical exercise test may be warranted in selected cases, for specific determination of functional capacity and limitations and precautions (if any). • slow progression of exercise to levels based on test performance and individual tolerance • consider individual need for initial conditioning program under medical supervision (indirect or direct)	Cardio-vascular
☐ intermittent claudication	progressive exercise to tolerance	Cardio-vascular
☐ hypertension: systolic 160-180; diastolic 105+	progressive exercise, care with medications (serum electrolytes, post-exercise syncope; etc.)	Cardio-vascular
☐ chronic infections	variable as to condition	Infections
☐ renal, hepatic & other metabolic insufficiency	variable as to status	Metabolic
☐ obesity (25-50+ pounds overweight)	dietary moderation, and initial light exercises with slow progression (walking, swimming, cycling)	Metabolic
☐ advanced pregnancy (late 3rd trimester)	taper off intensity near term	Pregnancy
☐ chronic pulmonary disorders ☐ obstructive lung disease ☐ asthma ☐ "exercise-induced asthma"	special relaxation and breathing exercises; breath control during endurance exercises to tolerance; avoid polluted air; avoid hyperventilation during exercise	Lung
☐ anemia – severe (< 10 Gm/dl) ☐ electrolyte disturbances	control preferred; exercise as tolerated	Blood
☐ hernia	minimize straining and isometrics; strengthen abdominal muscles	Hernia
☐ convulsive disorder not completely controlled by medication	minimize exercise in hazardous environments and/or exercising alone (e.g. swimming, mountain climbing, etc.)	CNS
☐ low back conditions (pathological, functional)	avoid forced extreme flexion, extension, and violent twisting, correct posture proper back exercises	Musculo-skeletal
☐ arthritis – acute (infective, rheumatoid, gout)	treatment plus judicious blend of rest, splinting and gentle movement	Musculo-skeletal
☐ arthritis – subacute	progressive increase of active exercise therapy	Musculo-skeletal
☐ arthritis – chronic (osteoarthritis and above conditions)	maintenance of mobility and strength, endurance exercises to minimize joint trauma (e.g. cycling, swimming, etc.)	Musculo-skeletal
☐ orthopedic	highly variable and individualized	Musculo-skeletal
antianginal antiarrhythmic antihypertensive anticonvulsant beta blockers digitalis preparations diuretics ganglionic blockers others	NOTE consider underlying condition. Potential for exertional syncope, electrolyte imbalance, bradycardia, dysrhythmias, impaired coordination and reaction time, heat intolerance. May alter resting and exercise ECG and exercise test performance	Medications
post exercise syncope	moderate program	Other
heat intolerance	prolong cool down with light activities	Other
temporary minor illness	postpone until recovered	Other

* REFER TO SPECIAL PUBLICATIONS FOR ELABORATION AS REQUIRED

If you have been cleared by your physician for unrestricted activity and/or a progressive exercise program, these key points may be of assistance to you.

- Components of a balanced exercise program (the 3S's)
  - Strength – arms, shoulders, back, abdomen and legs
  - Suppleness – stretch and relaxation of body and limbs
  - Stamina – endurance fitness through aerobic activities (large muscle action that increases the heart rate)
- Progression – slow and easy, gradually increase the volume and vigor of your activities over several weeks
- Warm up and cool down – quiet entry and exit of a few minutes each, such as with calisthenics and light activities
- FITT is a guide to your Stamina (endurance) activities

FREQUENCY	INTENSITY	TIME	TYPE
3 to 5 [illegible] times per [illegible] week [illegible]	[illegible] and sustain [illegible] target heart rate for your [illegible] during exercise [illegible]	[illegible] to exercise, attempt to keep moving for at least 15 minutes even if [illegible] means slowing down a little	[illegible] endurance [illegible] walking [illegible] jogging, swimming, cycling, skipping, vigorous ball games, ski touring, etc.

Pulse count is a good method to assess your response to aerobic exercises. Count for 10 seconds immediately after stopping your activity. Have your physician or exercise professional show you how to count your pulse. The chart below is age adjusted. Be content to work at the lower FIT START heart rate initially until your condition improves, then slowly increase the intensity of your activity until your heart rate is reaching the KEEP FIT level. Remember, enter and exit your activity gently.

FIT START

AGE	HEART RATE
20 29	[illegible]8
30 39	[illegible]12
40 49	[illegible]06
50 59	[illegible]30
60 69	[illegible]

KEEP FIT

AGE	HEART RATE
20 29	146 164
30 39	138 156
40 49	130 148
50 59	122 140
60 69	[illegible] 132

Derived from the "Half-As-Much" approach B.C. Department of Health

MAJOR REFERENCES FOR PAR$_X$ CHART

1. Fox S.M. III, Naughton J.P., and Haskell W.C. Physical Activity and the Prevention of Coronary Heart Disease. Ann Clin Res. 3: 404-432, 1971
2. American College of Sports Medicine. Guidelines for Graded Exercise Testing and Exercise Prescription. Lea and Febiger 1975
3. Committee on Exercise and Physical Fitness. Evaluation for Exercise Participation – The Apparently Healthy Individual. JAMA 219: 900-01, 1972
4. Cooper, K.H. Guidelines in the Management of the Exercising Patient. JAMA 211: 1663-67, 1970
5. Licht S. Therapeutic Exercise Volume III. Waverly Press, 1965
6. Recommendations and Guidelines of the Canadian Heart Foundation for Exercise Testing and Exercise Programmes for Improving Cardiopulmonary and General Physical Fitness 1975

PAR-X Physical Activity Readiness Examination

Par-X is the medical complement to Par-Q, the Physical Activity Readiness Questionnaire. Please refer to "Guide To Use" below.

NAME

ADDRESS

BIRTHDATE	SEX	TELEPHONE

S.I. No.	MEDICAL No.

[redacted]

	No	Yes	Comments / Additional History
Q1 Heart Trouble	☐	☐	
Q2 Chest Pain	☐	☐	
Q3 Dizziness	☐	☐	
Q4 Blood Pressure	☐	☐	
Q5 Musculoskeletal	☐	☐	
Q6 Other reason	☐	☐	
Q7 Over 65 Years	☐	☐	
Medications (relevant)	☐	☐	

[redacted]

	L	M	H
Job	☐	☐	☐
Leisure	☐	☐	☐

Fitness Program
- ☐ Regular
- ☐ Sporadic
- ☐ None

- ☐ Recreation ☐ Sports
- ☐ Fitness Program
- ☐ Other

PHYSICAL EXAM

Ht. _____ Wt. _____ BP ( )

- ☐ Cardiovascular
- ☐ Respiratory
- ☐ Musculoskeletal
- ☐ Other

[redacted]

- ☐ ECG
- ☐ Exercise Test
- ☐ X-Ray ☐ Hemoglobin ☐ Urinalysis
- ☐ Other

PLAN

[redacted]

[redacted]

Most adults are able to readily participate in physical activity and fitness programs. PAR-Q by itself is adequate for the majority of adults. However, some may require a medical evaluation and specific advice (exercise prescription).

PAR-X is an exercise-specific checklist for clinical use for persons with positive responses to PAR-Q or when further evaluation is otherwise warranted. In addition, PAR-X can serve as a permanent record. Its use is self explanatory.

Following evaluation, generally a PLAN is devised for the patient by the examining physician. To assist in this, three additional sections are provided:

- PHYSICAL ACTIVITY RECOMMENDATIONS (overleaf) with selected advice and pointers for most adults who are suited to participate in any activity and/or a progressive exercise conditioning program.
- PHYSICAL ACTIVITY PRESCRIPTIONS (PAR_X overleaf) is a chart-type checklist of conditions requiring special medical consideration and management.
- PHYSICAL ACTIVITY READINESS form (to right) is an optional tear-off tab for verifying clearance, restrictions, etc., or for making a referral.

The tear-off tab below is made available for use at the discretion of the Physician.

[redacted]

Based upon a current review of health status, _____

_____ is considered suitable for:

- ☐ Unrestricted Activity
- ☐ Progressive Exercise Program
  - ☐ with no restrictions/special exercises
  - ☐ with avoidance of _____
  - ☐ with addition of _____
- ☐ Only a medically supervised exercise program until further medical clearance
- ☐ Physiotherapy

Special Concerns (if any):

_____ M.D.

_____ 19 _____
Date

Further Information:
- ☐ Attached
- ☐ To Be Forwarded
- ☐ Available Upon Request

PAR-Q, PAR-X and PAR_X were developed by the British Columbia Department of Health. They were conceptualized and critiqued by the Multidisciplinary Advisory Board on Exercise (MABE). Translation, reproduction and use of each in its entirety is encouraged

Health History Statement
(Last Ten Years)

The information you provide in this statement will be used to assess your medical qualifications to participate in the POST Basic Academy Physical Conditioning Program. Please fill out the statement carefully and thoroughly. All information will be kept confidential.

Name: _____

Department/Academy: _____

Birthdate: _____

Today's Date: _____

Please answer all of the following. Check Yes or No on each question.

Do you now have or have you ever had any of the following?

Yes	No		Yes	No	
☐	☐	Allergies	☐	☐	High Blood Pressure
☐	☐	Arthritis	☐	☐	High Serum Lipids (fats--for example, Cholesterol)
☐	☐	Asthma	☐	☐	Musculoskeletal Problems
☐	☐	Chronic Bronchitis	☐	☐	Neurological Problems
☐	☐	Diabetes Mellitus	☐	☐	Obesity
☐	☐	Emphysema	☐	☐	Stroke
☐	☐	Heart Disease	☐	☐	Heart Murmur
☐	☐	Other (Specify)_____			

Have you ever experienced any of the following? For each condition checked, indicate whether the condition was diagnosed and whether the condition was associated with exercise or physical work.

Yes	No		Diagnosed? Yes	No	Associated with exercise or physical work? Yes	No
☐	☐	Chest pain	☐	☐	☐	☐
☐	☐	Chest pressure	☐	☐	☐	☐
☐	☐	Discomfort/pain in elbow	☐	☐	☐	☐
☐	☐	Discomfort/pain in jaw	☐	☐	☐	☐
☐	☐	Discomfort/pain in teeth	☐	☐	☐	☐
☐	☐	Discomfort/pain in throat	☐	☐	☐	☐
☐	☐	Discomfort/pain in wrist	☐	☐	☐	☐
☐	☐	Heart Palpitations/ skipped beats	☐	☐	☐	☐

Have you ever taken any of the following tests? If yes, indicate whether the results indicated any abnormalities.

Yes	No		Any Abnormalities? Yes	No
☐	☐	Exercise Stress Test	☐	☐
☐	☐	Exercise Stress Test with Isotopes	☐	☐
☐	☐	Echocardiogram	☐	☐
☐	☐	Coronary Angiogram	☐	☐
☐	☐	Holter Monitor	☐	☐

Has a blood relative ever been diagnosed as having any of the following? (Include parents, grandparents, aunts and uncles, brothers and sisters, and children, but exclude relatives by marriage and half relatives)

Yes	No		Mother	Father	Other
☐	☐	Diabetes Mellitus			
☐	☐	Heart Disease			
☐	☐	High Blood Pressure			
☐	☐	High Serum Lipids			
☐	☐	Obesity			
☐	☐	Stroke			

Have you ever smoked cigarettes, cigars or a pipe? Yes ☐ No ☐
If "yes," year you started: 19☐☐
Do you smoke presently? Yes ☐ No ☐
If you did or do smoke cigarettes, how many per day? ☐☐
If you did or do smoke cigars, how many per day? ☐☐
If you did or do smoke a pipe, how many pipefuls per day? ☐☐
If you quit smoking, year you quit: 19☐☐

Do you ever drink alcoholic beverages? Yes ☐ No ☐
If yes, what is your approximate intake of these beverages?

	None	Occasional	Often	How many drinks per week?
Beer	☐	☐	☐	☐☐
Wine	☐	☐	☐	☐☐
Hard liquor	☐	☐	☐	☐☐

List any traumatic injuries you have experienced to your bones or soft tissue (include any disabling back problems you have had) and the approximate date of the injury.

_____ Date _____

_____ Date _____

_____ Date _____

_____ Date _____

List any illnesses you have had which required you to take more than one week of sick leave and the approximate date of the illness.

_____ Date _____

_____ Date _____

_____ Date _____

_____ Date _____

List any operations you have had, including approximate dates.

_____ Date _____

_____ Date _____

_____ Date _____

_____ Date _____

List any medications you are now taking (include self-prescribed medications and dietary supplements).

Name of Medication (See labels for prescription medications)	Date Started	Dosage	Dosage Per day

List any athletic or other physical activities that you regularly engage in. Specify for each the frequency, intensity, and duration of your involvement.

	Activity	Frequency	Intensity	Duration
Example:	Bicycling	3 times a wk.	10 miles	Past 18 months

List anything else which you feel may be important in your medical history, including any conditions not specifically referred to in the preceding questions.

_____

_____

I hereby certify that all statements made in this Health History Statement are accurate and complete.

Signature in full: _____ Date: _____

Guidelines for Graded Exercise Testing and Exercise Prescription

AMERICAN COLLEGE OF SPORTS MEDICINE

2nd Edition

Lea & Febiger *Philadelphia 1980*

1

Guidelines for Evaluation of Participant Health Status Prior to Exercise Testing

Persons of any age may significantly increase their habitual levels of physical activity safely if there are no contraindications to exercise and a rational program is developed. For physically inactive persons there is no assurance that they can exercise safely. There is even less assurance that they will undertake exercise of the appropriate type, duration, intensity, frequency, and progression. Initially, physically inactive persons should be encouraged to participate in a supervised program primarily to learn how to exercise properly. For participants with coronary heart disease (CHD) risk factors or those with known cardiovascular, pulmonary or other diseases in which increased metabolic rates may be harmful, increases in physical activity for the purpose of physical conditioning should be carried out with supervision. The following guidelines are suggested for the evaluation of persons wishing to enter an exercise program or to change the type, intensity, or duration of their physical activity.

A. PRELIMINARY MEDICAL EVALUATION

The age and health status of participants are the major determinants in establishing appropriate screening and supervisory procedures for graded exercise testing and exercise programs. Participant categories based on variables such as age, symptoms, physical activity, CHD risk-factors, and disease have been determined pragmatically after the evaluation of many thousands of presumed asymptomatic individuals and patients with CHD (Table 1).

B. CATEGORIES OF CANDIDATE FOR AN EXERCISE PROGRAM

Category A: Asymptomatic, physically active persons of any age without CHD risk factors or disease will usually require little supervision if the current type, intensity, and duration of physical activity is maintained. They may require counsel and supervision if their exercise program is interrupted by injury, sickness, or the appearance of cardiorespiratory symptoms. Depending on the severity of the problem, reclassification into a different category may be necessary. Assistance may be required for persons wishing to change the type, intensity, or duration of physical activity. An individual's knowledge, functional capacity, age, and the degree of change in activity determines the assistance required. It is advisable for most persons, particularly those 35 years and older, to consult a physician and subsequently discuss changes in their current program with a certified exercise program director or exercise specialist. By definition, *functional capacity* is the value in METS or oxygen

TABLE 1. CLASSIFICATION BY AGE AND HEALTH STATUS OF PARTICIPANTS FOR EXERCISE TESTING

Category	
A	Asymptomatic, physically active persons of any age without CHD risk factors or disease.
B	Asymptomatic, physically inactive persons less than 35 years of age without CHD risk factors or disease.
C	Asymptomatic physically inactive persons 35 years and older without CHD risk factors or disease.
D	Asymptomatic physically active or inactive persons of any age with CHD risk factors but no known disease.
E	Asymptomatic persons of any age with known disease.
F	Symptomatic, physically active persons clinically stable for 6 months or longer.
G	Symptomatic, physically inactive persons clinically stable for 6 months or longer.
H	Symptomatic persons with recent onset of CHD or a change in disease status (Example: Recent myocardial infarction, unstable angina, coronary artery bypass surgery).
I	Persons for whom exercise is contraindicated (See Table 3, Contraindications for Exercise and Exercise Testing).

uptake for the highest exercise intensity completed. After a preliminary medical evaluation the functional capacity of persons in Category A may be determined by a field test or graded exercise test. If a graded exercise test is used, administration should be by qualified exercise test personnel. A field test may be self-administered or administered by a person qualified in graded exercise testing. A field test consists of stepping, walking, walking-running, or running for a period of approximately 15 minutes at the highest intensity the participant can maintain. The field test may take place on firm level terrain, a track, a treadmill, a bicycle ergometer, or steps. The functional capacity may be estimated in METS (Appendix F). The exercise prescription may be calculated from a maximum heart rate obtained during the field test. *Maximum heart rate* is defined as the highest heart rate attainable during an all-out effort. The maximum heart rate during a field test may be obtained by ECG or by palpation of the pulse. The latter is obtained during the immediate post-exercise period by counting pulse beats for 10 seconds and multiplying by 6.

Category B: Asymptomatic, physically inactive persons under 35 years of age without CHD risk factors or CHD, who wish to increase their habitual level of physical activity, may do so with minimal risk. If there are questions about health status of individuals who have not had a medical evaluation during the previous year, they should consult with a physician. The exercise prescription may be prepared by using the functional capacity and maximum heart rate obtained through either a field test or a graded exercise test as described for persons in Category A.

Categories C and D: Inactive, asymptomatic persons 35 years of age or older without CHD risk factors or CHD and asymptomatic persons of any age with CHD risk factors (Table 2) but no CHD, should have a complete medical evaluation and a graded exercise

TABLE 2. MAJOR CHD RISK FACTORS AND PREDISPOSING PROBLEMS OF CARDIOVASCULAR DISEASE

CHD Risk Factors:	1. Hypertension 2. Hyperlipidemia 3. Cigarette smoking 4. Electrocardiographic abnormalities *a.* Evidence of old myocardial infarction *b.* Ischemic ST-T changes *c.* Conduction defects *d.* Arrhythmia *e.* Left-ventricular hypertrophy
Predisposing Problems:	1. Family history of coronary heart disease before age 60. 2. Sedentary life style 3. Type A coronary prone behavior pattern with stressful occupation and lifestyle 4. Diabetes mellitus 5. Hyperuricemia 6. Obesity

test. This test may be administered by persons certified in exercise testing with a physician in the testing area. The physician need not be in visual contact with the subject but must know that the graded exercise test is in progress and be responsible for the safety of the participant.

Categories E, F, and G: Asymptomatic persons with known CHD and physically active persons with stable status (healed myocardial infarction, angina pectoris, pulmonary disease, or claudication) and physically inactive persons with clinically stable symptoms need careful evaluation of specific medical problems and required medications. The graded exercise test must be administered by persons certified in graded exercise testing with a physician in visual contact with the patient during the test.

Category H: Symptomatic individuals or persons with recent changes in disease status require the same careful evaluation and testing as those in preceding categories E–G. In addition, a thorough careful assessment is needed of signs and symptoms, ECG, and of the type and dosage of medication.

Category I: Persons for whom exercise is contraindicated should not be admitted to an exercise program until the medical problems have been evaluated and treated. Many Category I patients have problems in which exercise is contraindicated. Others have not had their disease status controlled adequately to allow exercise or even exercise testing to be performed safely (Table 3). Patients in this second group may be treated until improvement of the medical problems allow re-assignment to Category H or G. Abnormal heart rhythms and conduction disturbances may be

controlled by a change in medication or the use of a pacemaker. Severe valvular diseases or coronary artery obstruction may be improved by surgery. Pulmonary disease patients may be improved with drugs. These examples indicate some types of cardiac and respiratory problems that may be improved sufficiently to allow exercise to be safe.

Some physicians in private practice find that screening patients prior to increasing habitual exercise is of great value in primary prevention and developing and maintaining patient rapport. Other physicians, because of a lack of facilities or qualified personnel, experience difficulty with exercise screening and exercise prescription. Under these circumstances, a central referral laboratory with qualified technical and medical personnel for exercise testing, prescription, and program supervision may be utilized. The information obtained from evaluation and testing should be sent promptly to the referring physician and others involved with patient care. This is particularly important in Category I patients who may need immediate medical guidance.

In summary, the limited availability of qualified health personnel and facilities in relation to the large volume of medical evaluations and graded exercise testing required to comply with these recommendations necessitates discretion in their implementation. The degree of medical supervision of graded exercise tests proposed varies from situations in which there may be no physician present, the physician is present but not in visual contact, and the physician is in visual contact with the participant. The appropriate protocol is based on the age, health status, and physi-

cal activity level of the person to be tested. All tests should be administered by a person qualified in graded exercise testing, preferably persons certified as an exercise test technologist, exercise specialist, or exercise program director and a physician when necessary.

C. MEDICAL EVALUATION

Information to aid in the screening of persons planning to increase physical activity is obtained from a medical evaluation. The medical evaluation should include (Appendix B):

1. *Comprehensive Medical History.* Personal and surgical medical history, family health history, and current life-style health habits (e.g. cigarette smoking, diet, alcohol intake, habitual physical activity, working environment, stresses) should be evaluated. Any history of chest discomfort, pressure, pain or anginal equivalent, arrhythmias, shortness of breath, intermittent claudication, other symptoms and signs related to cardiovascular or pulmonary disease, or orthopedic problems that may limit exercise should be considered.

2. *Physical Examination.* Those participants in categories A and B should have had a physical examination by the referring physician no longer than 1 year prior to the exercise test. Those in categories C–H should have a physical examination immediately prior to the exercise test. Special consideration during the physical examination should be given to the signs and symptoms related to cardiorespiratory disease and other contraindications to exercise testing (Table 3). These include: *(a)* precordial activity such as apical impulse, extra-cardiac sounds and thrills, murmurs, systolic "clicks", gallop rhythm (S3 and S4), arrhythmias; *(b)* bruits over the carotids, abdomen, and groin; *(c)* carotid, brachial, abdominal, femoral, popliteal, posterior tibial, and dorsalis pedis pulses; *(d)* evidence of pulmonary disease and chest deformity; *(e)* edema, hepatomegaly; *(f)* xanthoma, arcus lipoides, bilateral ear lobe creases; *(g)* bone and joint abnormalities (thumb sign, hyperextensibility).

3. *Laboratory Evaluation.* A record and an interpretation of a twelve-lead resting electrocardiogram (ECG), resting systolic and diastolic blood pressure must accompany the participant's medical history and results of the physical examination. Comprehensive blood counts, screening profile, lipid analysis, cardiac radionuclide study, echocardiogram and coronary arteriography results, chest x ray and pertinent bone x rays may be helpful if available but are not essential. If the patient has pulmonary disease, recent appropriate pulmonary test results should be available.

Data collected during a graded exercise test may be used in diagnosis and prognosis of cardiovascular disease, evaluation of functional capacity, development of an exercise prescription, and determination of the effectiveness of such therapeutic interventions as exercise, drugs, and cardiovascular surgery. Testing methods and other considerations are discussed in Chapter 2.